THE

# JOURNAL OF GAS LIGHTING,

## WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XI. No. 263—14th YEAR.] LONDON, NOVEMBER 18, 1862. [Subscription per Ann. { 15s. in Advance / 18s Credit. ] DOUBLE No. Price 1s.

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H. BOWEN, Engineer.

Gaslight and Coke Company,
Cardiff, March 13, 1862.

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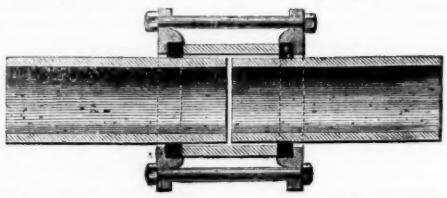

The advantages which these Joints offer are economy, perfect soundness and durability, ease and rapidity of application, use of perfectly plain pipes, without sockets, screws, or projections of any kind, so that a tight Joint may be made, even though the ends of the pipes to be united do not come close together. Any ordinary labourer is capable of securely fixing them.

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They are made in the most SOLID, SUBSTANTIAL manner, with PLANED and SURFACED JOINTS, and SCRAPED SURFACES. They have a CLEAR, FULL BORE, in a STRAIGHT LINE of PIPE, and are TIGHT to PERFECTION. All crooked tortuous passages causing heavy back pressures in driving through them are avoided.

Engineers are requested to insert "Valves of Walkers Manufacture" in their Specifications, by which they will be absolutely certain of the above important advantages. They can name the construction of Valve they prefer best, as Walkers make them of every description—either Walkers SCREW-VALVES, for the Gas-Works or for Street-Mains; INTERNAL RACK-VALVES; or the ORDINARY RACK and PINION-VALVES. REGULATING-VALVES, with INDICATING COLUMNS, &c.

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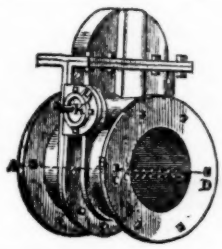

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COMMERCIAL ,,
EQUITABLE GAS-WORKS,
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**FOR SALE, very Cheap, fourteen** 15-in. Round Retort-Mouthpieces, with 4-in Outlet-Sockets; and twenty-eight Cast-Iron Lids.

For price, &c., apply to Mr. J. L. COCKER, Gas-Works, MERTHYR-TYDVIL.

**FOR SALE, a Second-Hand Dry-** LIME PURIFIER, in two Compartments each 3 ft. 9 in. deep by 5 ft. 3 in. square, with Hydraulic-Centre Valves; 7-in. connexions, two tiers of cast-iron trays, but made to be used with four. Sheet-Iron Covers, and Lifting Apparatus complete.

Also, two Circular WET-LIME PURIFIERS, each 8 ft. 8 in. diameter, by 2 ft. 6 in. deep; with agitators complete.

The above are all in good condition, and parted with to make room for extensions.

For price and particulars, apply to Mr. ROBERT RINTON, Gas-Works, MONTROSE.

PETROLEUM ACT, 1862.

**THE Metropolitan Board of Works** hereby give notice that by the 3rd section of the 25th and 26th Vict., c. 66, it is provided, that from and after the FIRST day of OCTOBER, 1862, not more than FORTY GALLONS of PETROLEUM, which by the 1st section of the said Act it is declared shall include any product thereof that gives off an inflammable vapour at a temperature of less than 100° of Fahrenheit's thermometer, shall be kept within Fifty Yards of a dwelling-house, or of a building in which goods are stored, except in pursuance of a licence given by the local authorities; and any petroleum kept in contravention of that section will be liable to forfeiture, and, in addition thereto, the occupier of the place in which such petroleum is kept, will incur a penalty not exceeding Twenty Pounds a day for each day during which petroleum is kept in contravention of the Act.

Notice is also given, that by the 4th section of the Act, the local authority to grant licences in the metropolis, as defined by the Metropolis Local Management Act, 1855 (except the City of London, and any harbour, port, dock, river, pier, or other works in or at which vessels ship or discharge goods or passengers), is declared to be the Metropolitan Board of Works.

Parties making application for licences are required to send to the Offices of the Board a correct plan, and full particulars in writing, of the premises in which petroleum is proposed to be stored.

Any further information may be obtained at this Office, between the hours of nine and four o'clock.

By order, JOHN POLLARD,
Clerk of the Board.

Spring Gardens, Oct., 1862.

**METROPOLITAN BOARD OF WORKS.**

MAIN DRAINAGE OF METROPOLIS.
SOUTHERN LOW-LEVEL SEWER.

**TO Builders, Contractors, and Others.** —The Metropolitan Board of Works hereby give notice, that they will MEET at the Office of the Board, Spring Gardens, S.W., on Friday, the 12th day of December next, at Twelve o'clock at noon precisely, and will then be prepared to open TENDERS by parties who may be willing to CONTRACT for the CONSTRUCTION of BRICK SEWERS, nine miles 2895 feet in length, or thereabouts, with other works in connexion therewith. The Sewers will commence at High Street, Putney, and be continued along Wandsworth Lane, Love Lane, High Street, Ram Lane, York Road, Battersea Road, Nine Elms, Wandsworth Road, New Bridge Street (Vauxhall), Harleyford Road, Kennington Oval, Harleyford Street, Camberwell New Road, Grosvenor Street, Grosvenor Park, Albany Road, St. George's Row, Brunswick Road, Neate Street, Old Kent Road, and terminate at High Street, Deptford, in the counties of Surrey and Kent.

Parties desiring to submit Tenders may, on and after Wednesday, the 12th inst., upon payment of £5. 5s., obtain Plans, Sections, Specification, form of Tender, and other particulars, on application to Mr. J. W. BAZALGETTE, Engineer of the Board, at the Office, Spring Gardens, between the hours of Nine a.m. and Four p.m.; or on Saturdays, between the hours of Nine a.m. and Two p.m., until Thursday, the 11th day of December next.

The Tenders are to be addressed to the Clerk of the Board, and must be delivered at this Office before Four o'clock on the last-mentioned day, and no Tender will be received after that hour. The parties tendering must be in attendance at the Board at Twelve o'clock on the day appointed for opening Tenders.

The Board do not bind themselves to accept the lowest or any Tender, and the party whose Tender shall be accepted will be required to provide two approved sureties for the due and satisfactory performance of the works.

JOHN POLLARD, Clerk of the Board.

Spring Gardens, S.W., Nov. 6,

STOURBRIDGE FIRE-CLAY WORKS.

**E. BAKER and CO.**
(Contractors to Government).
24 WHARF, HARROW ROAD, PADDINGTON, W.

Every article manufactured at their own Works and Mines, Brierley Hill.

FIRE-BRICKS, Lumps, Squares, Tiles, and Gas Retorts of all dimensions.

CRUCIBLE and CEMENT CLAYS.

GARDEN EDGINGS, of various patterns.

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ANOTHER

MEDAL AWARDED BY THE JURY, INTERNATIONAL EXHIBITION,

1862,

**To THOMAS GLOVER,**

SUFFOLK STREET, CLERKENWELL GREEN, LONDON.

THOMAS GLOVER has great pleasure in informing Gas Companies and his other Patrons, that the *Jury of Class XXXI. of the International Exhibition of* 1862 have awarded, for his Patent Dry Gas-Meter, *a Prize Medal.* The reason given for this Award, in the Juries Official Report, is, "*For excellence of manufacture, as regards Dry Meters.*" See Official Report, p. 346.

It is worthy of remark, that the only two other Firms who receive Awards *both manufacture imitations of Thomas Glover's* Patent Dry Gas-Meter, and the reason given for these Awards is "*construction* and sound workmanship." Thomas Glover, therefore, claims that the *construction* of his Meter has obtained *three Awards from the Jury of the International Exhibition of* 1862; at the same time, *contrasting* the Award granted for his Meter by the words, "*For excellence of manufacture, as regards Dry-Meters.*"

The Prize Meter will be found in Class XXXI., No. 6301, connected with a 1-foot holder, to demonstrate that a 50-light Meter *measures and indicates accurately the small quantity of One Foot.*

# WILLIAM PARKINSON AND CO.

(SUCCESSORS TO SAMUEL CROSLEY),

PATENT WET AND DRY GAS-METER MANUFACTURERS, &c.

**COTTAGE LANE, CITY ROAD, LONDON, E.C.**

**Established 1816.**

## PATENT IMPROVED WET METER.

W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

"It is well known that in Meters constructed so that the valve will close when the water is drawn off to such a point as to render them 3 per cent. slow the lights are liable to be extinguished by the closing of the valve by a sudden increase of pressure. To meet this difficulty, Mr. Pinchbeck has invented an ingenious and simple arrangement by which the action is reversed, and any such increase of pressure, in his Meter, raises the value instead of depressing it. The fact of the improvement having been adopted by Messrs. W. Parkinson and Co. is a sufficient guarantee that it practically and effectually remedies the inconvenience it is designed to meet."—JOURNAL OF GAS LIGHTING.

## PATENT IMPROVED DRY METER,

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## NOTICES.


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## TO CORRESPONDENTS.

A GAS MANAGER.—*A gas company may refuse to supply gas through a stamped meter in places where the Sale of Gas Act has not been adopted, or where no compulsory obligation exists to supply gas to any person demanding it; but it would be impolitic to refuse a supply unless there was some sufficient reason to doubt the accuracy of the meter or the solvency of the consumer.*

*No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*


# THE JOURNAL OF GAS LIGHTING,
## WATER SUPPLY, & SANITARY IMPROVEMENT.

*TUESDAY, NOVEMBER* 18, 1862.


## Notes upon Passing Events.

FROM time to time, there arises a well-founded complaint that the children of the labouring classes of London are styed up in courts or driven into the streets for want of playgrounds. Those who are happy enough to live near the Elysian fields of Kensington, Hyde Park, Green Park, St. James's, Victoria, and Battersea, show, by the way they disport there, how keen must be the deprivation of the thousands who are out of reach of such pleasant pastures. It is quite painful to mark the efforts poor children make amidst a desert of narrow streets and yards to find a space for play, just as it is pleasant to see the crowds of little ones that flock into such oases as Temple Gardens. Yet there are within the bounds of the metropolis some hundred acres in detached lots at present of no earthly use, unless it be to grow weeds, and afford bowers of bliss for amorous cats. These are the graveyards so properly closed a few years ago. These graveyards are of all sizes, from a few square yards to several acres, in all sorts of odd situations. Some in the very heart of the City, where land is sold almost by the inch at the price of silver plate of moderate thickness; others of goodly dimensions in the roundabout regions of the Bedfordian squares. It was only the accident of a line of pavement up, that we discovered the other day in a bye street near Regent's Square, what might be an extremely pretty garden—the Bloomsbury burying-ground, with grass and trees at present apparently only used for drying somebody's clothes. Our proposition is that either by local action or by a general Act all these burying-grounds be turned over to local authorities to be used as free playgrounds, after being decently prepared for that purpose. If Dr. Letheby, or any other professionial sanitarian, considers that in any of these "parsons freeholds" the "*human humus*" prevails so much as to be likely to give out unwholesome vapours, it will be very easy to lay on a coating of cement or asphalte. Gravestones, in most cases, now neglected and steadily decaying, may easily, and with propriety, be arranged against the walls, or in some other suitable manner, for preserving the records of the departed. The situation of graves may be noted on a plan with an index, in a written register; or any grave of national historical interest may be marked out by a special monument. But it is only necessary to take a walk through the graveyards of London that have been closed ten years, to see how few there are, who after such period, care whether a grave is flat or convex. In country villages, the graveyard has been from time immemorial a playground for the children, as well as a grazing-ground for the parson's pony, and the clerk's donkey. Scores of burial-grounds have been traversed by streets and railways, built upon, and turned to all manner of uses. Nothing can be less reverent than the utter neglect into which many metropolitan graveyards have fallen. It would not be desecration, but consecration to devote these now waste spots, under proper arrangements, to the use of a class and an age which are helpless in such matters as obtaining air and exercise.

Miss Rye, who has long and zealously devoted herself to improving the condition of her own sex, has at length sailed with a large party of female emigrants to Australia, and thus given one more proof of her self-sacrificing devotion. As we happen to know something practically of Australian emigration, we

have not the least doubt that Miss Rye's first idea of sending out a number of educated women as governesses to Australia was a mistake—but a mistake into which a clever enthusiast taking up the subject of emigration, as a new thing, was very likely to fall. There are only two ways of safely conducting female emigration. The first is to find, on the other side the water, homes—not barracks but homes—where married women of respectable character will receive, protect, and place the girls committed to their charge. Barracks, or by whatever name they may be called, are a mistake; collections of women are in themselves corrupting. It must be remembered that the dearth of women, which really exists in Australia, does not commence in the towns. Nearly twenty years ago, when the bushmen were clamorous for maid-servants and wives, Mrs. Chisholm found the then chief part of Australia glutted with unprotected women, and saw the only way to dispose of surplus cargoes was to march them into the bush. The chief towns of Australia even now have but a small fixed population in such easy circumstances as to be able to take up, on philanthropic principles, the management of homes for emigrant women. Miss Rye, who is a woman of sense and action, will find this out, and frame her plans accordingly. We have no doubt that after a few months in the colonies, and one voyage, she will come to the conclusion that the only satisfactory mode of carrying out the emigration of women is to send them with their natural guardians—their fathers, mothers, or other near relations. The idea of cargoes of single women is a delusion; there is no choice between that rare article—a young married couple—and a complete family. The labour-employing colonists themselves were long unwilling to admit this fact. They looked on Family Colonization as burdened with too many unproductive hands; but, by degrees, they learned that select able-bodied couples without children were not to be had, and accepted assisted emigration—that is, they allowed parties in the colony to nominate relations in this country toward whose passage the colony contributed half the passage-money; these were of course family colonists. The Lancashire cotton famine affords Australia a great opportunity for obtaining emigrants of both sexes, far superior, intellectually, to the raw Irish who have perforce lately formed the chief cargoes of free emigrant ships. But the Lancashire millowners will not part with them if they can help it. The Australians are as keen and as "*cute*" as the millowners—we shall see which will make the best bargain. The paid lecturers sent from Australia have been a complete failure. The Manchester school have always been opposed to emigration, because its tendency is to raise the rate of wages, and even in this awful crisis they cannot unlearn their old maxims of selfishness.

The list of subjects for which the Institution of Civil Engineers offers premiums is eminently practical, but does not present so many amusing features as that drawn up, while Mr. G. P. Bidder, the Jupiter Tonans of the society, presided. Perhaps, the discussions will be none the worse because the present president has no son for whom it will be necessary to work the oracle, and give a medal for a paper any schoolboy could have written quite as well, and many much better. One scarcely expected that such an arrangement would have been perpetrated under the reign of so loud a denouncer of other people's jobs as Mr. G. P. Bidder. There is no doubt that, although little was said on the occasion, a good deal was thought; and the value of the medals offered by the institution was seriously deteriorated. Among the subjects suggested as texts for papers are the following:—"On the Manufacture of Bricks by Machinery; and their Comparison with hand-made Bricks." A really good essay on this question would be of great value. There are several brick-making machines which are outrageously puffed and vigorously advertised; but one constantly hears of the disappointmenfs of foreign purchasers, both at the cost of working and the value of the article. There are members and associates of the institute—especially amongst contractors—who could tell us exactly what a brick-making machine can and cannot do. If such experienced men as Mr. Brassey and Mr. Betts would take the trouble to give the results of their experience, perhaps, in the course of a year or two, after the reading of the paper, a printed report might see light, and tell brickmakers what to buy and what to avoid. "The construction of suspension bridges with rigid platforms" will bring out something concerning the hideous but useful Lambeth Bridge, just opened to the public use. Wonderfully cheap it is; would it were more picturesque! Twenty-five guineas are offered for "An account of existing Water-Works." This will probably give a valuable book, and a lively discussion. The old story of the drainage and sewerage of towns, and the disposal of the sewages, comes up again—suggested, no doubt, by the commissioners and the committee of 1861 and 1862. "A History of any Harbour of Refuge, including the Reasons for selecting the Site, the Mode of Construction adopted, &c.," will tell us something more about Holyhead and Dover. "Descriptions of the various Kinds of Machinery in Use for the Shipment of Coal, noticing those in which the greatest Expedition is combined with the least Amount of Breakage of the Coal, and Accounts of the Means of Unshipping and Measuring Coal," will probably produce from the pen of Mr. J. Harrison a handbook not to be obtained in any other than through an institution like the Civil Engineers. Such books are invaluable, and yet rarely pay to publish separately. We shall have, no doubt, something very original and curiously illustrated, in the application of photography to engineering. There is one more subject for an essay which we should be glad to see added to the list of fifty from which we have quoted, and that is, "On the best Mode of Reporting, Editing, and Publishing the Discussions of the Institution of Civil Engineers." At present, the best discussions on the most important public questions are often of no more value than an after-dinner table-gossip. An elaborate essay is read, full of the results of scientific and practical experience, perhaps on a subject on which the Government is about to act, or the Parliament to legislate. A discussion, occupying two, three, or four nights, follows: facts, figures, and close reasonings are interspersed with sallies which are not, unfrequently, both wise and witty. The educated assembly cheers rapturously. The hearer, unaccustomed to the arrangements of Great George Street, goes home delighted, preseeing that the next morning, or at any rate within a week, the public will, in some shape, have the benefit of the eloquence and the thunders of the Engineering Parliament. Perhaps, there is a Red Sea Telegraph job trembling in the balance of a House of Commons Committee. But the stranger who expects anything of the sort is bitterly disappointed—days, weeks, months, roll on. The telegraphic ruins are safely buried in the Red Sea, and forgotten. At length, a thick report appears, admirably printed and usefully illustrated, and of value as a reference on the technical question discussed, but fearfully dull reading, so corrected and erased and improved that there is scarcely a trace of original style in any one of the speakers. So, the report is thrown aside for future use by compilers of cyclopædias. There was perhaps one reason for this careful censorship—"In our hot youth when great Brunel was King"—in the west; and the Battle of the Gauges was fought as fiercely as the battle of the Corn Laws—there was then no choice between a rigid censorship and the breaking up of the institution. But those times are past; the great men, whose like we shall not see again in our time, are dust. The reputation of the society is established; the fostering care, the admirable tact of the honorary secretary, have been perfectly successful. He is, if not the founder, the man to whose management and zeal and guardianship the existence of the society is mainly due; but guardians and parents and nurses are apt to think that their charges are never grown up into men and women. They do not appreciate the value of a little healthy neglect, and throw themselves into constant unnecessary alarms lest Miss Adeline, aged nineteen, should make herself ill with too much ice and waltzing; or Master Tommy, six feet high, with a moustache like a Life Guardsman, yield too far to the seductions of cabanas and cold without. A new generation is rising up at the institution, who naturally wish not always to remain under tutorship, especially as the tutor's original zeal has naturally slackened in the face of devouring time. The brilliant days of the institution have passed away probably for ever; its future influence must rest on solid, useful work, and the most useful work would be the early publication of transactions carefully but not over-critically edited. It is a farce to hear Ajax Bidder defying the thunders of Downing Street, and denouncing the jobs of the Treasury, when we know that reporters are hermetically excluded, and that the oration on a subject of national importance is merely for the amusement of the speaker and a small audience. If foolish things have been kept out of print, insolent impertinences have been uttered which would never have found air had reporters been present.

# Circular to Gas Companies.

We insert in another part of our present number the first portion of a valuable paper "On the different varieties of burners used for gas lighting, and researches on the best conditions for the combustion of gas," translated from the *Annales de Chimie et de Physique*. The long series of experiments described were conducted under the direction of MM. Dumas and Regnault, the eminent chemists, by M. Paul Audouin, a nephew of M. Dumas, and M. Paul Bérard, with the view of determining the best means of ascertaining the illuminating power of gas, and the kind of burner best adapted for its combustion. The carcel lamp, burning 42 grammes or 648 grains of oil per hour, is the standard generally adopted in France, and with it the gas consumed by different burners was compared. During the course of the experiments, about one hundred different burners were tried in comparison with each other, and with the carcel lamp. It may be observed that, by the adoption of that lamp as the standard, the difficulties of the experiments were considerably increased, for the light of such a lamp, with the same consumption of oil, varies with the height of the wick and the position of the glass chimney, which required to be regulated with great nicety. The experiments on gas recorded in the first part of the paper relate almost exclusively to the sizes of bat's-wing burner best fitted for any given consumption of gas in public lamps; and, in the second part, which we purpose to insert in subsequent numbers of the Journal, comparison is made of the respective merits of other kinds of burners, the result of which we may now state is favourable to the bat's-wing for public lighting. The most important fact, however, which these experiments tend to confirm is, that, with equal consumptions of gas, the greatest degree of illuminating power is obtained with the feeblest pressure, whatever kind of burner be employed. With all burners, and at all degrees of consumption, the maximum illuminating effect is stated to be produced with a pressure from ·07874 to ·11811 of an inch. The maximum illuminating power was obtained, in all the experiments with bat's-wing burners, when the slit was $\frac{1}{30}$th of an inch wide, and such a burner, in comparison with one with a slit $\frac{1}{254}$th of an inch in width and burning the same quantity of gas, gave four times the amount of light, the illuminating power increasing very rapidly with the diminution of the pressure. There are, of course, limits to the reduction of the pressure, beyond which the flame becomes unsteady and smoky; and these experiments fully establish the generally-recognized fact that, when the consumption of gas decreases, the light is diminished in a greater proportion than the quantity. The experiments were made with common coal-gas, and it is stated that for cannel gas the conditions of combustion are different, burners with small apertures being more advantageous than large ones for the richer kind of gas, as it requires a greater quantity of air for its combustion. We shall revert to the subject when we publish the concluding portion of this important paper, which describes the experiments with other burners, the photometer employed, and the manner in which the observations were made.

We were invited, last week, to witness some experiments on a "process of making gas from air without the use of coal," recently patented, in this country, by M. Mongruel, of Paris. In the process exhibited, however, nothing so impracticable was attempted as the conversion of atmospheric air into inflammable gas, and it resolved itself into a method of impregnating air with the vapour of naphtha, or of some other hydrocarbon, so as to render it combustible. The apparatus for conducting that part of the process consisted of a gasholder, filled with atmospheric air, which was connected by a tube with a cylindrical carburetting vessel, about 12 inches high and 10 inches in diameter. The air, after passing through that vessel, was conducted by a pipe to an argand burner at a distance of 3 feet, and burned with a white and highly-luminous flame. In a second exhibition of the process, nothing more was attempted than to show the superior advantage of M. Mongruel's method of carburetting coal-gas. An argand burner, consuming about 5 feet of common gas per hour, was supplied through a meter, and the time occupied in burning the tenth part of a cubic foot of gas was noted in the usual manner. The same burner was then supplied with the gas after it had passed through the carburetting vessel, and, the flame having been adjusted so as to give nearly the same light as before, it was shown that upwards of double the time was required to consume an equal quantity of the carburetted gas. According to the statement of the patentee, there is a saving of 75 per cent. when the carburetting process is applied to coal-gas, and of 25 per cent. when it is applied to atmospheric air. It might be supposed, indeed, that, as the air costs nothing, the per centage of saving would be much greater when the process was applied to it than when applied to gas; and the statement that the result is otherwise, proves that the carburetting material employed must be of a costly kind, though its composition is kept secret. This plan of naphthalizing atmospheric air seems to be little more than a revivification of the invention of Mr. J. T. Beale, which was patented in 1834, and produced much sensation at the time; but the plan did not prove to be economically practicable, and, though a patent for improvements in Mr. Beale's lamp was obtained three years afterwards, they were not sufficient to overcome the objections to his plan of burning common air; which, after a short, brilliant career, was abandoned as troublesome and costly.

Under the head of "Register of New Patents," there will be found the provisional specification, with drawings, of an invention by a Mr. Barnett, for improvements in street-lamps, which has been applied in Paris, and to which the correspondent of the *Times* drew attention on the 29th of July last, as a great improvement in the lighting of that city, in combination with the new standards and lanterns, of which we gave drawings in our number for the 7th of October. The white enamelled reflector, placed horizontally above the flame, with conical chimney of the same material for the escape of the vitiated air, and the regulated admission of fresh air beneath, so as to prevent the flickering of the flame by the wind, were mentioned as having greatly improved the lighting of the streets; one of the advantages of the enamelled reflectors being that they are not tarnished by sulphuretted hydrogen. The invention does not, however, seem to have met with sufficient encouragement in England to induce Mr. Barnett to proceed with his application for a patent; and, by the publication of the provisional specification, it has become public property.

The judgment of the Lord Chancellor on the case of Mr. Hills against the Liverpool United Gas Company is reported at length in another column, and with it we presume that litigation on this subject will end, as the term of Mr. Hills's patent for the purification of gas by oxide of iron expires in November next. It will be seen that the Lord Chancellor upholds the claim of Mr. Hills to the revivification of the oxide, for he decided that, though the defendants were privileged to use the natural product, bog ochre, once, they could not use it again, after exposure to the atmosphere, without an infringement of the patent. In this peculiar state of the law, it is probable that the Liverpool Gas Company may find it to be advantageous to store the spent material until the term of Mr. Hills's patent expires; and they may congratulate themselves that they escaped the payment of the plaintiff's costs.

The spirited conduct of Messrs. Anderson and Jones, in defending their characters as gas contractors from the attack made on them at Dover, has highly incensed those who conceive that gas companies, and the suppliers of gas are legitimate objects for abuse. The *Builder* has entered the field against them, and expresses astonishment at their "impudence," in commencing an action against their calumniator; and asserts that the public have begun an "indignation subscription"—for what object is not stated—and that "Messrs. Anderson and Jones will shortly be made to feel as if they had brought a nest of hornets about their ears." Our contemporary, apparently, is not aware of the real facts of the case, nor of the charges against which the contractors had to defend themselves. It was not a mere complaint against the quality of the gas at which they felt aggrieved. Mr. Bennett, or any other consumer of gas in Dover, had full right to complain if he had reason to think that the quality of the gas was bad, or the supply defective; but he was not justified in publicly asserting that "it seems quiteim possible ever to be able to get a good supply of gas from the present contractors;" that "there is no town in England with such bad gaslight as Dover;" and that he believed "the quality to be deleterious." By such assertions, the contractors were accused of having grossly violated the terms of their contract with the Dover Gas Company, and the accusation was calculated to do them injury in their business as contractors in other places. They, there-

fore, called on their calumniator either to prove his charges or to retract them; and, the former being impossible, he took the latter course, and inserted a letter of apology in the same paper in which the calumny appeared. The proceedings that have since taken place in Dover have proved that there was no real ground for the complaint, and that the defective lighting which was noticed in some establishments arose from causes entirely within the control of the consumers, and was not attributable to defective supply of gas, or to its deficiency of illuminating power. The subject was introduced in a jocular manner at a meeting of the local board of health on the 30th ult., on which occasion the mayor, who is the proprietor of the Lord Warden Hotel, observed that "pretty nearly all the gas was rammed out of the pipes before it reached his neighbourhood," and that he was obliged to light a candle to read a newspaper, though there were four gas-burners in the room. Other members of the board also spoke to the same effect, and reiterated Mr. Bennett's joke, that they were obliged to light candles to see if the gas was burning. Messrs. Anderson and Jones forthwith waited on those gentlemen, to ascertain what truth there was in such assertions; and, on examining the gas-fittings and the burners, the cause of the defective lighting was discovered. In the case of the Lord Warden Hotel, which is situated at the farthest extremity of the town, at a distance of about a mile and a half from the gas-works and on the same level, the proprietor had ill-advisedly fixed a governor between the meter and the burners, which reduced the pressure three-tenths; the flow of gas to each burner was further obstructed by the introduction of smaller "governors," consisting of small brass boxes filled with iron wire; and the light was also obstructed by the use of dirty ground-glass globes. When these obstructions were removed, there was an ample supply of gas; and, at the next meeting of the board, the mayor stated, in justice to the contractors, that he had now a very excellent light. We understand that the initial pressure at the works is so regulated as to give a minimum pressure of eight-tenths in that part of the district in which the Lord Warden Hotel is situated, and that pressure is quite sufficient for efficient lighting, under ordinary circumstances; but certainly it is not calculated to overcome the resistance of defective governors and obstructed burners. Two other members of the board, who had spoken about the dimness of the gas, were also called on by Messrs. Anderson and Jones, and the defect was in each case found to be owing to the obstruction of the gas by the burners, as they explained at the next meeting of the board. The unfounded attacks on the contractors have thus produced their own refutation; and we beg to suggest that the "indignation subscription" mentioned by the *Builder* should be appropriated to the purchase of a testimonial for those gentlemen.

The *American Gaslight Journal* quotes, with angry comments, our recent observations on the liberal conduct of the New York gas companies in not raising the price of gas, in accordance with that of other manufactured articles; and, with a remarkable confusion of ideas, conceives that to charge the consumers with the excise tax on gas is the same as an advance of price that would increase the profit on the quantity sold. Our contemporary would, perhaps, perceive the difference more clearly were the case his own. Were a tax imposed on each number of his journal, we have no doubt he would raise the price at least in proportion; and, instead of deriving extra profit by the higher charge, he would experience loss, by the consequent diminution of his circulation. The gas companies are similarly circumstanced; and they are making considerable sacrifice of their former profits by raising the price of gas only sufficient to cover the tax; when they are obliged to receive payment in "greenbacks," "gumbacks," and "shin-plasters," which are at a discount of 30 per cent. and upwards, compared with the gold they must pay for all imported materials they purchase. The last advices report a successful strike of the gas-men for higher wages, which must further diminish the profits on the sale of gas, unless the price be raised. Experience is forcing on our contemporary some other lessons which we hope may enlighten him. He joined in the cry for competition in gas in New York, and the formation of the "Metropolitan Company" was hailed as a sure forerunner of a reduction in the price; but, such hopes have been disappointed, before the new company has come into operation, by a districting arrangement which assigns separate districts to the Manhattan and the Metropolitan companies; and thus destroys the expected rivalry. Experience of this common end of most competitions is not, however, sufficient to put a stop to the call for further grants of charters to new companies.

We insert a letter from Mr. G. W. Stevenson, of Halifax, in reply to our remarks on his report to the Lighting Committee of the corporation of York, in which letter he reiterates his opinion that a capital of only £35,000 would be required to erect and carry on a gas-work for the supply of the whole of that city. He appears, however to have omitted from his estimate any allowance whatever for parliamentary expenses, which must necessarily be incurred before the town council could erect a gas-work, and there is no mention of land, nor of meters and service-pipes for the supply of 4000 customers, nor of fittings, nor working capital. If these items be added to his estimate, it would nearly reach the amount of the actual capital of the York Gas Company. Mr. Stevenson seems anxious to disconnect himself from any assumed association with Mr. Flintoff or Mr. Hughes in hostility to gas companies, which the concluding paragraph of his report suggested, and we shall therefore make no adverse comment on his explanation. Some misapprehension appears to be entertained respecting the doubts we raised as to the ability of the corporation to borrow the money required to carry out the scheme at 4 per cent. on the security of the gas-works. They have borrowed large sums at that rate of interest *on the security of their rating powers;* but, we continue to maintain that on the security of a *gas-work alone,* without power to make up a deficiency out of rates, they would have to pay considerably higher interest.

P.S. While preparing for the press we have received a copy of Mr. Haywood and Dr. Letheby's report to the Commissioners of Sewers, on the carburetting of the street lamps in the City of London, which we lay before our readers, reserving for our next all comments on this important document.

## Correspondence.

### THE PUBLIC LIGHT QUESTION IN YORK.

SIR,—For the accuracy of my calculations respecting the cost of supplying gas to the public lamps of York, I am responsible only to my clients, the Lighting Committee of the corporation, and to the inhabitants of that city, and I do not propose to discuss the question in your columns; but I cannot rest under the imputation of cherishing the *animus* against companies which, in your "Circular," you allege against me. What I said, in my report, as to the disadvantage under which companies labour, who have to pay dividends upon an accumulation of misspent capital, applies equally to corporations, commissioners, and other local authorities, having gas or other trading works where this state of things exists. The "disadvantages" of the "incubus" are so apparent as scarcely to require ordinary discernment; and it is manifest that, in York, the company, with a nominally-invested capital of £60,000 to £70,000, could never expect to hold its own against the corporation, with equally good or superior works, and an invested capital of only £35,000.

My reference to the "monopoly which appears to be a serious evil," was, unlike the preceding remark, intended to have a purely local application. The price of gas in York is, I believe, higher than in any town of 10,000 inhabitants and upwards in the county; and it is not the corporation only, but the general body of consumers, who, in consequence, feel themselves aggrieved. Indeed, so much is this the case, that, at the elections last week, the chief test of fitness applied to each candidate for municipal honours was, willingness to exert himself to obtain a reduction in the price of gas.

It is, undoubtedly, a most serious thing for a corporation or company to pull up the streets throughout a city like York, for the purpose of laying down mains, where they already exist of sufficient capacity to meet the wants of the public. I feel sure this will not be done by the corporation of York until every means have been tried, and reasons, persuasions, and, if need be, "threats," exhausted in the endeavour to bring the company to terms; but, if all should fail, it is a question for the corporation to determine—Whether they ought not, as guardians of the public interests, to exercise their powers, erect works, supply gas to consumers, and so be the agents in "destroying a monopoly which," under the special circumstances of the case, I repeat, "appears to be a serious evil."

*Halifax, Nov.* 6, 1862. G. W. STEVENSON.

### STOREAGE OF PETROLEUM.

SIR,—On reading your reports of the discussions concerning petroleum at the meetings of the Metropolitan Board of Works, it strikes me that the risk to the public would be diminished, if it is made one of the conditions on which the licence is granted, that the licencee shall keep a book, to be open to the police or other

inspection, in which all sales of petroleum or products of petroleum shall be entered. If this is not done, petroleum or products of petroleum may be sold under other names, and it may be a difficult matter to prove that the substance in question is petroleum or a product thereof; but, by keeping a book, as proposed, the substance would be traced in the same way as spirits can be traced by the Excise.

In dealing with such a fearfully dangerous substance, every means should be taken to protect the lives and property of the community, as far as it is possible to do so. F. C. S.

## Register of New Patents.

257.—Hermann Schatten, of Hesse Cassel, civil engineer, for "*Improvements in the manufacture or construction of gas-meters.*" Patent dated Jan. 31, 1862.

This invention consists of a pair of diaphragms or drums, which are constructed in metal, of a cylindrical form, and move independently on their axles in bearings. They are placed in a cylinder of sheet metal resting on its own periphery, and divided by a solidly-fixed partition. These diaphragms are opened by a cuneiform segment or incision in their two lateral walls at the same part, one side of which opening is hermetically closed by a transverse partition. The other side is left open and sufficiently deep to allow the liquid to preserve its level within and without the diaphragms whilst the meter is working. The liquid which forms the levels of resistance, is contained both in the diaphragms, and between them and the enclosing frame. The two cylindrical compartments are connected by an opening at the bottom of the partition. The liquid level is obtained by filling through an opening until the liquid overflows. The diaphragms have a double action, as on one hand the gas within them raises the partition-walls, whilst the level of the liquid acts as a level of resistance; and, as on the other hand, the gas acts on the outer partition-walls, the outer level of the liquid, and forms the resistance. The central compartments of the diaphragms are filled with air, and float on the liquid, the friction in the beds being thereby materially diminished. The interior of each of the two diaphragms contains a narrow gas-pipe, in the shape of a ring, in order to introduce the gas below the partition. These rings are fixed at the point of insertion in the front and back partition from which the gas-tube is continued to the sliding-valve. The motions of the diaphragms do not embrace a whole circle, but a half circle. When reaching one limit of their motion (semi-rotation), the alternating introduction of the gas commences by means of the alternating action to be hereafter described, the diaphragms move back to the starting point, and here the alternating introduction of the gas recommences. It is this constant and uniform extent of their motion which secures the certainty of a constant and exact measure, and its independence of the level of the liquid. Any contrivance for preserving the normal level hitherto necessary in gas-meters of a drum-shape, and rendering their construction more or less complicated, is thus obviated. The measure is not affected by a lowering of the level, as the liquid does not perform the office of measuring, but the constant and uniform extent of the alternating movement of the diaphragms serves as its basis. In the centre of the front and back partition, extending to the interior of the diaphragms, are placed two alternating contrivances thus arranged through the gas-tubes, that the sliding-valve of each of the two diaphragms is brought into play by the semi-rotatory motion of the other diaphragms. The alternating motion of the diaphragms is the result of this contrivance, and this arrangement, not applicable to the sliding-valves of gas-meters with leather diaphragms of a similar form, affords the mathematical certainty that no combination can occur in the position of the sliding-valves, in which unmeasured, and, therefore, not registered gas can pass through the meter.

In order to avoid interruption in the working of this meter, which must occur in consequence of an excessive pressure of the gas, or of an excessive lowering of the level of the liquid, the inventor provides a regulator for checking further motion as soon as the limit of one inch has been touched, which he fixes as its extent.

For the purpose of regulating the capacity of the drums, the patentee attaches a fork to the axle, the prongs of which, bending outwards, strike right and left at every semi-rotation of the axle against fixed angles soldered to the inner frame. A metal limb with two holes, in which the prongs of the fork are placed, and which, by being moved forwards or backwards, contracts the fork or expands it, enlarges or contracts the semi-rotatory motion of the diaphragms.

261.—John Hargreaves, of 12, Clifton Cottages, Clifton Road, Peckham, for "*Improvements in the manufacture of pipes or tubes for conveying water, gas, acids, sewage, enclosing electric telegraph wires, and for other purposes, which improvements are also applicable to the manufacture of other vessels and articles, and in the machinery or apparatus connected therewith.*" Provisional protection only obtained. Dated Jan. 31, 1862.

This invention consists, firstly, in combining and treating various materials or substances, which are converted into a bituminous mastic, possessing density, ductility, hardness, great strength to resist pressure, and various other qualities, which render this bituminous mastic well adapted for the manufacture of pipes or tubes, conduits for telegraphic wires, invert blocks for sewers, damp-proof courses for walls, and for various other purposes. In its manufacture, the following ingredients are employed:—Bitumen, cement, chalk, clay, flint, lime, oyster and other marine shells, river or other sand, slag, and slate. The inventor also utilizes the refuse and short waste of cotton, worsted, wool, hemp, flax, tow, jute, cocoa-nut fibre, and other fibrous materials, gutta-percha, caoutchouc, gums, and oils. The solid materials are thoroughly dried, all moisture being expelled by evaporation, for which purpose they are placed in a hot drying-room or kiln. When sufficiently dry, they are placed under the action of powerful runners, which grinds them into a fine powder. A certain proportion of the powder of each ingredient, according to the article intended to be made, is then placed in a hopper or receiver, from which they are passed through a sieve or screen, which thoroughly mixes them together. The powder thus mixed is then placed in another stove or kiln, until it is heated to the proper degree of temperature required. A sufficient quantity of melted bitumen is run off into a reservoir, with a revolving apparatus attached, and to this is added the requisite quantity of the waste of gums, oils, and fibre, and, when these are properly incorporated with the melted bitumen, a certain portion of the powdered mixture is added, until all the various ingredients are thoroughly amalgamated into a stiff, plastic substance.

The second part of this invention relates to improved machinery or apparatus for manufacturing pipes or tubes, vessels, or other articles, from this improved bituminous mastic. For this purpose, a cylinder is constructed with an outside casing or steam-tight jacket, into which annular space a current of superheated steam is admitted, in order to keep the bituminous mastic at a proper and sufficient degree of temperature. In the inner, or working part of the cylinder, a moveable piston is provided, for forcing the bituminous mastic through the orifices of the die or mould. On the bottom of the cylinder is a hollow space or chamber, in which are placed ducts or passages to admit a current of cold air, and, in some instances, a fine stream of water, for the purpose of regulating and reducing the temperature of the bituminous mastic on its passage through the orifices of the die or mould, which die or mould is secured to the bottom of the hollow chamber of the cylinder by bolts and nuts, or other suitable contrivance. Below the cylinder, is suspended a moveable table or platform, counterbalanced. The piston is put in motion by suitable gearing, driven by a steam-engine or other prime power, and the downward motion of the piston forces or compresses the bituminous mastic through the aperture between the die and the core. The moulded bituminous mastic rests upon the table or platform below, which descends by its pressure until the pipe or other article is formed of the requisite length and size.

264.—Edward Cradock Monckton, of Fineshade, in the co. of Northampton, Esquire, for "*Improvements in the application of electricity for obtaining ammonia and other useful products during the combustion of coal and fuel, and in the apparatus employed therein.*" Patent dated Jan. 31, 1862.

The simplest and most primitive method of operation is to apply the electric current by means of wires and iron rods or chains, or pieces of graphite or plumbago, to the coal or other fuel in the furnace; the result is, that the heat of the fire is soon greatly intensified and rendered incandescent. A steam-pipe with a stop-cock attached to it is then introduced into a tube of larger calibre, the sizes of each pipe being adjusted relatively to each other, according to the relative quantities of steam and air that are required as regards the size of the furnace, the quantity of fuel and other ingredients used, and also as regards the product required. A small steam-boiler and superheater is also placed in connexion with the furnace, should there not be one in use already. Steam is then admitted into the smaller pipe, and, causing a vacuum, air instantly rushes in and forms a blast; this plays over and among the electrified coke or fuel, and a decomposition and recombination of elements take place; thus any nitrogen from the decomposed air combining with the hydrogen of the steam will form ammonia; the oxygen eliminated will oxidize the coal; any nascent carbon combining with the ammonia forms a carbonate. Any sulphur in the coal uniting with the oxygen will become sulphuric acid, and uniting with part of the ammonia form a sulphate, and any products not meeting with a suitable chemical equivalent and not combining will pass off, while the combining and useful products sought for thus formed are either at once to be received in suitable vessels, or made to enter into further chemical combinations at pleasure, after such a manner as is now ordinarily done—for example, any ammonia may be made to unite with the sulphuric, nitric, or muriatic acids by its gas being brought into contact with them in a concentrated or diluted form; or the free nitrogen may be united with caustic alkalies or their solutions, or any cyanogen formed be taken up and combined by similar means where it is found advisable. The materials to be further acted upon are to be subjected to a continuous and incessant action of electricity on them, as they are made to pass through suitable channels by means of points of carbon, metal, or other suitable material inserted in opposite sides of these channels, from one to the other of which points the electric spark is made to flow, and, where necessary, over a considerable space, extending in some instances to several inches, by means of powerful induction coils, with or without condensers or Leyden jars, so that, though the passage is quite free for the gas or liquid to pass along the whole channel, this, throughout its section, is occupied by the electric fluid playing across into it, which will act on the entire body passing along and through it.

The claim is for the methods of obtaining ammonia and other useful products by the application of electricity, and the apparatus employed therein substantially as herein described.

270.—Leon Fauvel, of Paris, Manufacturer, for "*Improvements in apparatus for indicating the existence of escapes in gas-tubing, and for stopping the continuance thereof.*" Patent dated Feb. 1, 1862.

These improvements relate to apparatus for indicating the existence of escapes in gas-tubing, and for stopping the continuance thereof; and they consist in providing either the gas-meter, or the tubing itself, with an apparatus which is put into action by the gas passing through the meter, or through that part of the tubing where the apparatus is situated, thereby causing a wheel, provided with proper projections or pins, to revolve and act with the said pins against the end of a hammer, and make this latter strike an alarum. The object of the apparatus is to indicate the occurrence of an escape of gas during the time the burners are not lighted, the escape causing the measuring-drum in the meter to revolve and an alarum to be struck, whilst a suitable valve is allowed to shut the inlet-pipe for the gas, so as to prevent this latter from reaching the hole where the escape took place.

The claim is for—

1. Providing the gas-meter fixed on the gas-tubing with the above-described arrangement for causing or not an alarum to be rung, and for causing at the same time a valve to shut the pipe by which the gas is allowed to enter the meter, in order that whenever during the time the burners are not lighted an escape of gas should take place in the meter, or

in that part of the tubing connecting this latter to the burners, this escape be stopped at once, and if wished, indicated by the alarum.

2. Providing the pipe leading from the mains to the gas-meter with a supplementary meter, provided with the above-described apparatus for working or not an alarum, and for causing a valve to shut the said pipe whenever an escape of gas should occur in the tubing between this supplementary meter and the burners during the time the latter are not lighted.

290.—GEORGE MANWARING, of Southampton, Hants, engineer, for "*Improvements in flushing-apparatus for closets, sewers, and other water-services.*" Patent dated Feb. 4, 1862.

This invention consists of self-acting mechanical appliances, whereby the closet is cleansed after the same has been used, by means of supplying water through a cistern connected to and working with a small supply cock or inlet-valve, to which an air-vessel is applied, by which means the supply-valve can be worked against any pressure with ease and soft action, the large outlet or discharge-valve from which is closed, while the inlet-valve is opened, and *vice versâ*.

The following is a description of one of the methods adopted in carrying out this invention:—Water is admitted into a cistern through a supply-cock or valve, fitted to the upper part of the cistern, to which is attached an internal loaded floating ball, which gives power to the ball-lever sufficient to open the valve against any pressure. This connecting-lever to the valve is regulated by a connecting-rod having adjusting stops and pins in it, which causes a proper pause of time in the action in the opening and shutting of the supply and discharge-valves, causing them to be worked with the greatest accuracy; the lower end of this connecting-rod is jointed to the discharge-valve; in the middle of the rod the lever of the floating-ball works, and the upper end of this rod is jointed to the working lever, which takes its fulcrum from the end of the cistern at that part of this lever where it is attached to the connecting-rod; the under part of the joint is acted upon by a lifting-arm on the weigh or weighted shaft, which is provided with guides for the connecting-rod; the lifting-arm raises the working-lever, and the connecting-rod by means of the counter-weight after the same has been kept down by the closet being occupied, during which time the cistern is filling with water; by this motion, it causes the supply-valve to close and the discharge valve to open.

The particular formation of the moving joints or bearings which are applied avoids the necessity of bolts, screws, or joint-pins, rendering the general application simple, cheap, and durable; and the supply-cistern cannot be affected by the frost, it being only charged during the time the closet is occupied.

When the apparatus is applied to work self-acting, it is thus: the closet-seat may be hung on pivots or hinges, or otherwise, competent to allow the same to decline about three-quarters of an inch. When the closet is occupied by a person, it is thus kept down: the connecting-chain or wire from the seat presses the end of the working-lever down, which closes the discharge-valve and opens the supply-valve, and allows the cistern to fill with water to the required height; the ball then floats, which causes the supply-valve to shut; all then remains stationary until the person leaves the closet-seat, which then rises again to its original height, by means of the spring or weighted lever; and the counter-weigh or weighted shaft then raises the working-lever and the connecting-rod, which opens the discharge-valve; and the supply of water in the cistern descends through the down-pipe to the pan of the closet, and flushes the soil away to the sewers.

This invention may also be applied without being made to work self-acting—that is to say, the chain or wire from the working-lever may be worked by hand; then the mechanical appliances in the cistern will work the same as before-mentioned.

This invention will be found especially adapted to high pressure, as all waste of water will be effectually prevented, and no leakage is likely to occur; it may also be applied with low pressure. The size of the cistern may be varied to suit circumstances; one, however, of the capacity of one and a half gallons is sufficient to supply an ordinary water-closet.

297.—JAMES WEBSTER, of Birmingham, Warwickshire, engineer, for "*Improvements in gas-fittings.*" Patent dated Feb. 4, 1862.

This invention refers, firstly, to improvements in the knibs or burners; and, secondly, to the slides of moveable pendents or gaseliers. In making these improved knibs or burners, an aperture is cut for the gas in such direction that the flame jets out downwards, and then rises upwards, slightly in a mushroom-form.

In the argand burner, holes are perforated in a ring round the side of the burner instead of upon the top; the effect of this arrangement is that the air acts upon the flame immediately as it issues from the burner, and more perfect combustion is ensured.

The improvements in the sliding-part of the moveable pendents or gaseliers consist in the employment of a substitute for the balance-weights and chains connected to the ordinary water-slide, which substitute is thus formed: upon the water-cup is secured a gland or stuffing-box, provided at the top with a screw or nut, for the purpose of tightening the parts. Round the fixed tube is wrapped loosely a strip of thin metal or metal-gauze, overlapping the joint; for this purpose, block-tin, in the form of thin sheets, is preferred. Over this runner, and completely surrounding it, is placed a short tube of vulcanized rubber, acting with equal pressure all round the metal-runner; the rubber keeps the metal-runner always in immediate contact with the fixed gas-tube. A loose collar is employed to work upon the top of the india-rubber tube, compressing it, but without affecting the metal-runner; and this loose collar is kept to its work by a screw and cap working into the stuffing-box.

The patentee claims, without limiting himself to the precise details described, the several improvements in burners and fittings for gas; and in slides for pendent gaseliers, substantially as herein more fully set forth and specified.

316.—MICHAEL HENRY, of 84, Fleet Street, London, E.C., patent agent, for "*Improvements in obtaining and applying motive power, and raising and forcing fluids, and in apparatus employed therein.*" A communication. Patent dated Feb. 6, 1862.

According to this invention, the apparatus is constructed on the following principle—If a wheel revolve within a closed chamber, and have water or other fluid travelling freely through it, such fluid being admitted at the centre, and discharged at the circumference, it follows that the dynamical effect of the stream of fluid when issuing from the closed chamber will be to the power that drives the wheel in inverse ratio to the proportion or relation between the sectional area of the delivery-opening or outlet through which the fluid issues, and the sum of the sectional areas of the fluid-ways or channels in the wheel through which the fluid travels, so that supposing the delivery opening to be of a certain sectional area, and the wheel to have at its circumference a certain velocity, then the amount of power required to keep up each velocity will be so much the less in proportion as the velocity of the "motion of transferrence" with which the fluid moves from the centre of the wheel to its circumference, is reduced. The fluid issuing from the chamber may be applied to propelling and other motive and useful purposes, or the apparatus may be used for pumping or raising and forcing fluids. The apparatus for carrying out this principle, and which apparatus is herein called an *aqua motor*, consists in its simplest form of a wheel so constructed or arranged that fluid may be admitted into it, pass or travel through it, and be discharged from it; the said wheel revolving within a stationary close chamber, in which is developed and from which may be transmitted the power produced by the centrifugal action of the fluid travelling through the wheel. A wheel of this description can be constructed by mounting on an axis a number of parallel discs set near together, or two or more parallel plates or surfaces connected by other plates or vanes, in such manner as to form passages or channels, hereinafter called ways or fluid-channels, which lead from the centre or axis of the wheel to the circumference and are open at each end, so that fluid may be admitted at the centre of the wheel (that is, at the inner ends of the fluid-channels), may fill the channels, and be driven by centrifugal action to the circumference. This apparatus is in accordance with the law of mechanics, that "forces are one to the other as the velocities which they transmit to the same moving body in the same interval of time." This wheel is charged with fluid, and revolves within a chamber or casing. Now, suppose all outlets from the latter were closed, the wheel would then only present the same resistance to its driving power as if it were a fly-wheel constructed of solid material, but the cohesive attraction of solid molecules is such as to resist disruption under centrifugal action, except at very high velocities, where as liquid molecules tend continually to yield to centrifugal action, and to escape the pressure which the liquid exerts in the casing, and transmits to the body of liquid therein, is equal to that which would be exerted by a column of the same liquid of a height coresponding to the velocity of the wheel at its circumference. But now suppose that while some driving power keeps the wheel revolving with uniform velocity, an outlet were opened in the casing for the liquid to emerge therefrom, the liquid in the casing would at once escape through such outlet, while the liquid in the wheel would acquire, in addition to its rotary motion, a motion which the patentee calls a "motion of transferrence," or travel from the centre of the wheel to its circumference (that is to say, through the fluid channels) to fill the space left in the casing by the escaped liquid. But as only as much liquid can be forced into the casing as is delivered therefrom, and, consequently, the velocity with which the water moves from the centre of the wheel to its circumference will be reduced according as the excess of the sum of the sectional areas of the fluid-ways or fluid-channels in the wheel over the sectional area of the outlet (or sum of the sectional areas of outlets) from the casing is increased; that is to say, taking it for granted that the sum of the sectional areas of the "fluid-ways or fluid-channels" in the wheel exceeds the sectional areas of the outlet or outlets from the casing, then the greater such excess, the slower will be the motion of the water through the fluid-channels. The elementary resistance presented by the wheel to its driving power, when the delivery-outlet of the casing is opened, will be at the same time proportionate to the velocity with which the liquid travels along the radius, and to the circular velocity, that is, the velocity of rotation at the wheel's periphery; hence the liquid receives an accelerated motion in a direction at right angles to the radius, and, as that resistance is proportionate to the quantity of liquid so accelerated, the work expended during, say, one second, to expel a given body of liquid, will be equal to the volume expelled, multiplied by the velocity of the "motion of transferrence," from centre to circumference. The circular velocity, that is, the velocity of rotation at the wheel's periphery, and the path described by the radius of the momentum of inertia. It follows, therefore, that there enters into the product of all the quantities which make up the resistance presented to the wheel's motion, when a required delivery of liquid is to be obtained through an opening of given section or sectional area and at a given rate of speed, a factor, which may be determined beforehand, namely, the velocity at which the liquid is to travel from centre to circumference (this velocity may be reduced as low as desired, and practically may be a small fraction); and, though the wheel may revolve rapidly, and considerable pressure be exerted in the casing, so that the liquid may be discharged therefrom with velocity, the liquid may be nevertheless caused to travel slowly through the wheel, and present but little resistance to the vanes, expending for that object less power than it produces by its centrifugal action; the *aqua motor* thus constitutes a generator, generating more power than is applied to work it. In hydraulic machinery, as at present constructed, centrifugal action has been applied, but not collected or accumulated, so that there is in some respects the same difference between the principle of those machines and that of machinery constructed according to this invention, as between boiling water in an open vessel and collecting steam in a closed vessel or boiler.

The claim is for—

1. Arranging and combining apparatus on the principle of construction hereinbefore set forth, so as to constitute a centrifugal generator of force and deliver a stream of fluid, such principle of construction being as follows:—If a wheel revolve within a closed chamber, and fluid travel freely through it, being admitted at the centre, and discharged at the circumference, the dynamical effect of the stream of fluid issuing from the closed chamber will be to the power that drives the wheel in inverse ratio to the proportion or relation between the sectional areas of the fluid-ways or channels in the wheel through which the fluid travels; so that, supposing the delivery-opening to be of a certain sectional area, and the wheel to

have at its circumference a certain velocity, the power required to keep up such velocity will be reduced in proportion as the velocity of the "motion of transferrence" with which the fluid travels from the centre of the wheel to its circumference is reduced.

2. The arrangement and combination of parts constituting the apparatus herein called *aqua motor*, in which a wheel, so constructed that fluid may enter it, travel through it, and be discharged from it, revolves within and delivers its fluid into a stationary close chamber or casing, in which is developed, and from which may be transmitted, the power generated by the centrifugal action of the wheel, substantially as described.

3. The combination of the *aqua motor* arranged and combined as described with a working receiver, in which it applies, or whereby it transmits its power, as and for the purposes set forth.

4. The arrangement and combination of parts constituting the apparatus herein called rotative, and hereinbefore described.

5. The arrangement and combination of parts constituting the improved turbine hereinbefore described.

360.—Gustav Lindemann, of Manchester, in the county of Lancaster, engineer, for "*Improvements in applying gas for the purpose of singeing or dressing yarns or threads, and woven fabrics; and for obtaining heat for other purposes.*" Patent dated Feb. 11, 1862.

Upon a framework are mounted rollers, over which the material passes. Within a space partly enclosed by the rollers is a hollow cylinder, the periphery ofwhich is provided with a number of slits, upon which the gas-burners aremounted. The end of the axis of the cylinder turns in a bearing; the other end is hollow, and also turns in a bearing; beyond which the said axis extends, and passes into a stuffing-box, the extremity being provided with a gas supply-pipe. When, therefore, the gas is turned on, it fills the cylinder, and issues from the long strip-like burners. Upon the axis of the cylinder is a small pulley, driven by a band from a shaft; and thus a rotatory flame is produced, which, as it revolves, plays upon the material during its passage through the machine.

The apparatus for drying woven or other such fabrics is constructed thus: a cylindrical casing, within which is a cylinder of wire-gauze, or other such material, which cylinder is caused to revolve, by any suitable arrangement, so as to convey the fabric from the point of entrance to the delivery-end. The burners formed as before in long slits are mounted or formed upon pipes, which are carried by end-pieces, and are connected in the middle by a chamber, which communicates by means of openings with the interiors of the said pipes. On each side of this chamber is a boss attached to the pipes, and carrying on one side a solid axis, and on the other side a hollow axis. The latter runs in a bearing provided with a stuffing-box, and a pipe leading from the gas supply, which gas can, therefore, flow into the pipes, and from them to the burners. Upon the axis is a pulley, which, by being driven from the motive-power, causes the gas-burners to revolve during the burning of the gas; and thus heat is generated, which passes through the gauze-cylinder and fabric to be dried, escaping finally through a chimney connected therewith.

The apparatus for boiling fluids the patentee forms in this manner. The vessel to be boiled has within it a series of pipes surmounted by a dome; and on the inside of these pipes is a conical chamber, enclosing the revolving gas-burners, which are constructed as follows:—A pipe constituting an axis, which runs in a bearing provided with a stuffing-box, or other suitable apparatus, for allowing gas to flow into the said hollow axis from a pipe connected with the gas supply. This axis is connected to a hollow ring by a pipe, from which there extends a series of pipes provided with burners. The axis is driven by a pulley, or by other suitable means; and the burners, therefore, are caused to revolve.

The patentee claims for the purposes of singeing or dressing yarns or threads, and woven fabrics; or for obtaining heat for other purposes; being the use of a revolving gas-burner or burners.

366.—John Robb, of Aberdeen, N.B., merchant, for "*Improvements in ventilation and in apparatus employed for that purpose.*" Patent dated Feb. 12, 1862.

In ventilating dwelling-houses which have been constructed without any special appliances for the purposes of ventilation, the patentee proposes to accomplish this object in the cheapest and readiest manner by making one or more windows the medium or media for the ingress and egress of the air. The upper sash is drawn down so as to leave a suitable opening—say, of two or three inches—the lower sash being drawn up to a greater extent, the width of such opening being adjustable by raising or depressing the sashes. The ventilating apertures being thus adjusted, a current of fresh air will enter at the lower part of the window, while the upper opening will allow the heated and vitiated air to escape. The ventilating openings are covered with perforated or pervious material, a continual supply of fresh air being thus admitted into the apartment or other place to be ventilated; but, the current of air being divided into minute streams by the structure of the interposed material, all unpleasant or injurious effects of draught are prevented. The material which is preferred for this purpose is perforated card-paper, manufactured in sheets of a size to suit any ordinary window, and rendered waterproof by the application of a solution of india-rubber or other suitable waterproofing substance or substances, and painted, varnished, and ornamented, as may be desired. Wire-gauze may be employed, but the material before mentioned is cheaper and also more durable than wire-gauze, which soon becomes oxidized and rendered unfit for use when exposed to the atmosphere. The perforated or pervious material is framed in wood, metal, or other suitable material, and made to fit close to the window sashes, only leaving room for the latter to be freely drawn up or down. If desired, the lower portion may be so constructed and arranged as to form a blind, for which purpose the perforated card-paper before mentioned is admirably adapted, as it is capable of being made highly ornamental. The perforations are preferred to be four hundred to the square inch for the lower sash, and about two hundred for the upper opening. The plan above described is, however, subject to one defect—namely, the opening at the middle of the window will still admit a current of air and cause some draught, and also admit dust. This may be obviated by adopting another modification of this invention, which is to fit or fix the perforated or pervious material into or upon the window sashes themselves, the glass or other material placed in the sashes in lieu thereof being made moveable, so as to adjust the openings for the ingress and egress of air.

In the application of this invention to new buildings, the patentee proposes to adopt the following method:—The fresh external air is admitted at the upper part of the building by a shaft or channel, and is conveyed by means of tubes or channels laid or fixed, or constructed in the most convenient parts of the building; such tubes or channels terminating in chambers, the fresh air from which is conducted by tubes to the apartments to be ventilated at a low level, there being provided suitable tubes or outlets, covered with perforated or pervious material, at the upper part thereof, for the escape of the heated and vitiated air.

The claim is for the combinations and arrangements of apparatus for the purposes of ventilation hereinbefore substantially described and set forth; or any mere modification thereof.

376.—John Stephen Joseph, of Rhostyllan, near Wrexham, in the co. of Denbigh, North Wales, for "*An improved retort-oven, and the utilization of the spare heat from the same.*" Patent dated Feb. 13, 1862.

This invention consists in constructing a large retort, built up of fire-brick, or other suitable refractory material, and surrounded by an outer structure of fire-brick, or other suitable refractory material, in such a manner that a space is left all round the retort, the ends of the same passing through the ends of the enclosing structure, and being provided with suitable doors. In order to support the retort, piers of fire-brick are formed, or other suitable refractory material, underneath the same. The retort constructed of a catenary, parabolic, or elliptic transverse sectional form, is preferred; but it is also constructed of any other such transverse sectional form that will stand firmly by itself, without requiring any material support for the sides. This retort-oven is employed for either making coke, charcoal, or for any other similar processes, wherein combustible gases are disengaged. At or near the top of the retort, suitable openings are formed, through which the combustible gases formed inside the same by any of the above-mentioned processes pass into the surrounding space. Small jets of atmospheric air are intoduced both into the space between the top of the retort, and the surface of the materials inside the same, as also into the space surrounding the retort, and thus cause the more or less complete combustion of the before-mentioned combustible gases, thereby creating an intense heat, which, having access to nearly the whole outer surface of the retort, causes the process which is taking place inside the same, to be effected in the most rapid and perfect manner. The hot products of this combustion are either allowed to pass away to a chimney, or, by preference, are employed for generating steam in a boiler or boilers for making illuminating gas in retorts, fixed either in the before-mentioned space in the oven, or enclosed in separate chambers, for firing pottery in separate ovens, for heating drying-stoves for general purposes, for calcining ores, for burning bricks, or for burning lime in kilns. For each of the above-named processes, the hot gases are conducted to the furnaces, kilns, ovens, or stoves, through suitable flues; and, in order to regulate the amount of heat to be supplied to these places, a communication between the retort-oven, and a chimney-shaft is formed, which communication can be opened or closed at pleasure, so as to allow more or less of the hot gases to escape.

The claim is for—

1. The construction of ovens for making coke, charcoal, or other similar processes, by which combustible gases are disengaged, which ovens are constructed of such a transverse sectional form as to require little or no support from the sides, and which are completely surrounded, except at the ends, by a chamber in which the gases proceeding from the interior of the ovens are caused to undergo more or less complete combustion by the introduction of a number of small jets of air into the said chamber, other jets of air being also introduced into the ovens themselves for the same purposes substantially as hereinbefore described.

2. The employment of the spare heat generated by the combustion of the combustible gases in the improved oven hereinbefore described for raising steam in boilers, for making illuminating gas, for heating drying-stoves, for firing pottery, for calcining ores, or for burning bricks or lime.

403.—Thomas Renison, of Glasgow, in the co. of Lanark, N.B., plumber for "*Improvements in water-closets.*" Patent dated Feb. 15, 1862.

This invention relates to a novel arrangement of water-closet, of an exceedingly simple, economical, and durable character, and not liable to derangement, which may be described as follows:—The discharge-outlet, or opening from the basin, is to one side, and communicates with a valve-chamber, the bottom of which leads by the usual trap-bend to the discharge-pipe. The lower part of the valve-chamber is made with two inner shells, rising up from the bottom round, or outside of the outlet in the bottom, and parallel to the sides, so as to form two narrow spaces running round and opening at their top. The valve, or closing detail, consists of an inverted cup, formed with two sides with a space between them, and shaped so as, on being lowered, to enter the narrow spaces formed round the outlet in the lower part of the valve-chamber. This inverted cup-valve is opened by means of a rod and handle, by which it is lifted directly upwards, being guided by projections, which work two of them in the corners of the valve-chamber, and a third in a guide, formed for it in the side of the chamber. The upper edge of the inner fixed shell is made a little lower at the part next the basin-opening; and, when the valve is lifted, the contents of the basin discharge themselves across the edges of the shells, into the central space, and away by the outlet. The valve-chamber is in communication by a pipe with a small cistern, arranged at the back of the basin, and in this cistern there is a float and a lever, which works the stop-cock, or valve of the water-service pipe. From this stop-cock the flushing water finds its way by a branch and fan into the basin in the usual way. When the valve is lifted, the water leaves the cistern as well as the basin, and the float falls in consequence, and the stop-cock is thereby opened. The water flows into the basin, and thence by a branch into the cistern, until the float rises high enough to close the stop-cock. When closed, the valve, although not necessarily touching any part of the valve-chamber or its shells, will support the water in the basin a considerable height above itself. The spaces in the chamber become filled with water, whilst the space in the valve is occupied by air; and, when the valve is lowered, the air is compressed and

acted upon by opposing columns of water in such a way that the water in the basin is supported at the proper height. If the water in the basin rises too high from any cause, it overcomes the resistance of the confined air, and passes through the spaces and off by the outlet, in consequence of which a separate overflow to provide against overfilling is rendered unnecessary. The cup, or valve, and the chamber-spaces are shaped so as to work with perfect freedom, and do not require to be in contact; consequently, the parts may consist of simple castings, requiring no fitting nor finishing, and of trifling cost, and they will also be the less liable to get out of order.

The patentee, without confining himself to the precise details, claims—the construction or arranging of water-closets substantially in the manner hereinbefore described, and more particularly the using therein of an inverted cup-valve, with two shells, or sides, dipping down into separate spaces, formed for them round the outlet, substantially as hereinbefore described.

407.—Joseph Wall, plumber, and Thomas Dodd, glass merchant, both of Liverpool, Lancashire, for "*Improvements in the construction and arrangement of apparatus for regulating the flow or passage of fluids.*" Provisional protection only obtained. Dated Feb. 15, 1862.

The objects of this invention are, firstly, to economize the fluids for flushing water-closets; and, secondly, to secure perfect regulation and flushing by a simplification of apparatus for that purpose, part of which is applicable for controlling the flow of fluids otherwise used.

Under that part of the title of the invention where "construction of apparatus" is mentioned, reference is made to a new device of an equilibrium three-way tap or apparatus, so planned that by movement of the spindle a supply of fluid is permitted to flow through in one direction, and by movement the contrary way the supply is closed, and the same fluid returned through the same tap or apparatus, and finally passed off or discharged by a third way. This tap or apparatus, which is suitable for use in many positions, and for other purposes than flushing water-closets, has a rigid spindle, on which is a button or other valve, fitted to close against suitable seatings, and will be better understood in the following description of its application or use as part of the "arrangement of apparatus," also mentioned in the title.

It has been above stated that one object is to economize flushing fluids; the patentees therefore adopt the system with pressure-cistern and pressure-seat, both of which are well known. The tap or apparatus, above referred to, is fitted to the supply-pipe from the street-mains, in large towns from a cistern at an elevation or from any other source. It is also secured to a second pipe for carrying the flushing fluid to the pressure-cistern (which is fitted in the ordinary position), and from the said pressure-cistern back again to the tap, and also to a third pipe for carrying the said flushing fluids from the said tap or apparatus to the pan; thus the tap or apparatus is so placed that the depression of the moveable seat acts on the spindle, closes the passage to the pan, opens the supply-valve or passage to the cistern, and permits the flushing fluid to pass into the pressure-cistern, which, of course, will contain more or less according to the height of the supply-column. When the seat is allowed to rise to its normal position, the supply-valve is closed by the movement, and communication is only open between the pressure-cistern and water-closet pan, into which latter, by way of the second and third pipe connexions hereinbefore mentioned, the flushing fluid will be discharged with force by the pressure of the compressed air contained in the said cistern. As all the parts act simply by the weight of the person using the closet, and as the quantity of flushing fluid contained in the pressure-cistern is all that can be used at one time or by one movement, waste is prevented.

431.—William Clark, of 53, Chancery Lane, London, W.C., engineer and patent-agent, for "*Improvements in gas apparatus used for lighting cigars and other tobacco.*" (A communication.) Provisional protection only obtained. Dated Feb. 18, 1862.

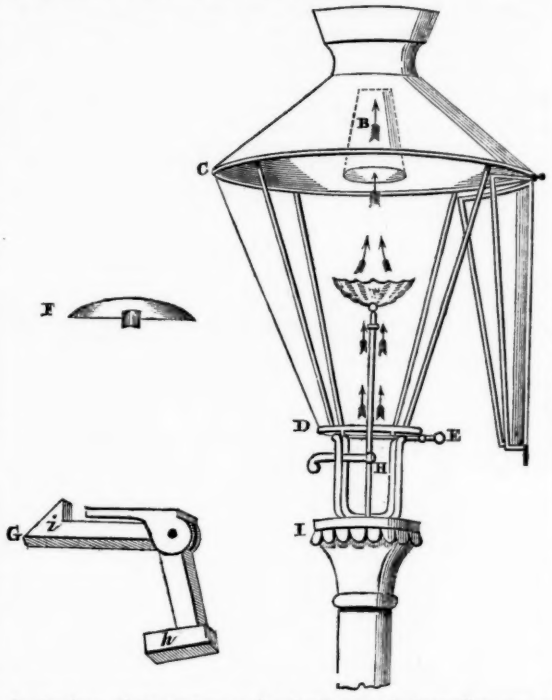
This invention relates to an improved moveable apparatus to be used in cigar and tobacco shops by smokers, for lighting cigars or tobacco, instead of the lamps, candles, or gas-jets and splints, usually employed for the purpose. The inventor is aware that certain patents have already been obtained for similar lighting apparatus, which, however, differ from the arrangement hereinafter described. In the former, the interior arrangement of the parts renders it difficult, if not impossible, to obtain emission of the gas, and regulate its combustion. The valves also become easily choked, and obstruct the passage of the gas so much, that it becomes attenuated in volume; it is also necessary to take the apparatus entirely to pieces to clean it, which can only be done by an experienced hand.

This invention relates to an improved apparatus, in which all the foregoing disadvantages are obviated. It consists of a hollow metal tube, fixed to a handle by means of a socket. The lower end of the first tube carries a tube of smaller diameter, serving for the filtration and for the burner of the gas. The upper end of the hollow metal tube has a screw-thread, for the purpose of fixing a metal stopper therein, which is slightly filed, so as to allow of a small jet of gas escaping between the tube and the stopper. This stopper has an opening at its centre, carrying a rod, having a valve at its lower part and a hook at the upper part. The valve is formed of several round balls, forming a weight, which opens and closes hermetically the opening in stopper. The hook at the upper part of the rod is attached to a cord of less length than that of an india-rubber tube which encloses the whole, and serves to conduct the gas.

From the foregoing, it will be understood that, if the apparatus is suspended, the rod carrying the valve will be raised by the short cord, and, consequently, the balls will close the orifice in the stopper, so that the gas-jet can only escape between the first tube and the screw-thread of said stopper, while, on the contrary, if the apparatus be raised, the weighted ball-valve will fall, and afford passage for a larger jet of gas than that which can pass through the screw-stopper, when the tobacco may be at once lighted. The apparatus is then again let fall, causing the valves in rising to close the orifice in the stopper, so as only to leave the smallest jet of gas burning, which escapes through the former.

439.—Frederick Barnett, of 230, Oxford Street, London, W., for "*An improved lamp or lantern for street-lighting and other purposes.*" Provisional protection only obtained. Dated Feb. 19, 1862.

The change of shape and other improvements the inventor proposes for street and other lamps or lanterns have for object a better development of reflection of gas or other light; hence, an increased illuminating power—without additional cost; the same to be obtained in conjunction with the inventor's enamelled reflectors, or with other apparatus in lieu thereof. Also, by a regulated current of air, to prevent the fluctuation of the flame either of gas or of any other illuminating material used in my lamps; hence, a more perfect combustion. Also for an arrangement to light the said lamps without a ladder, or a trap in the bottom of the lamps. These street or other lamps for like purposes have a greater diameter in their upper parts near the covers or domes, C, than have the ordinary ones. From their greatest diameter they diminish rapidly towards their lower parts at D, until they are reduced to less than one-third of their largest diameters at their bases, becoming no larger than that part of the capital of the lamp-post, I, on which they are fixed; by which system and form, the lower frame will cause little or no shadow beneath.




In the base of the lantern, a glass having a neck descending one or more inches, F, presenting the *coupe* or half. This neck is sufficiently large to pass the pipe supporting the burner, and enough air to feed the flame. This descending neck opposes in a great measure the entry of the wind by gusts. The cock, H, is placed beneath the neck, between the lamp and the lamp-post. The key of the said cock having a projecting piece of metal sufficiently long to enable the lighter, by means of a stick, to turn it off and on from below. In the upper part of the lantern is placed an enamel reflector in its largest diameter horizontally, C to c, or otherwise. In these reflectors are either one or more oval or round holes, according to the quantity and nature of the burners. These holes are surmounted by one or more oval or round conical chimneys, B, from six to eight high. Thus by means of the limited admission of air from the neck at the base of the lantern, and the limited exit of rarefied air by the chimney or chimneys, the supply will be regulated; and the air thus admitted at the bottom will pass immediately through, feeding the flame in its passage, as indicated by the arrows , and thence be drawn directly upward by the updraught established by the conical chimney or chimneys, taking with it the exhalations and smoke of the gas, by which means the flame will be scarcely disturbed, even in stormy weather, and, as a natural consequence, the combustion will be more perfect, and the interior of the lantern remain longer clean; and, as a common result, a better light be obtained, both by the natural and reflected light, with the same consumption of gas, or other lighting materials. For the purpose of lighting the gas, or other lighting materials, from the footpath, without a ladder, the door of the lantern opens on a hinge placed on the upper part of the door at C, and that part of the cover or dome with which when closed it comes in contact. On the lower part of the door, in the middle of the frame, a piece of metal is extended, which the inventor calls a bolt; this same shuts into a spring-catch fixed solidly on the lower frame of the lantern, so arranged that when the door be pressed to, the bolt is held by the catch, thus keeping the door closed. From this spring-catch, the inventor extends a spur some few inches, which, when pressed back, causes the catch to relinquish its hold on the bolt at the bottom of the door, by which operation the door liberates itself, and as the door is hung by its hinge in the largest diameter above, the lower part will immediately fall back in a perpendicular position as at E, in seeking its centre of gravity, leaving an opening ample to pass a lighting lamp arranged at the end of a pole or staff to be applied to the burner; by means of this same pole, the gas-cock, at H, will be opened, regulated, and closed without the use of a ladder. One side of this lighting-staff will be covered with india-rubber or stuffed leather. This same part, when the door has to be closed, will be pressed against it so as to force it home to the spring-catch, which, as above shown, will keep closed.

These improved lamps or lanterns can be made round, square, or in

any other desired shape, and in all sizes. The catches to hold and liberate the door can be made in various ways, with or without springs; G is a catch acting by centrepoid without spring. This catch, which is invented for this use, is very desirable as obviating the risk of breaking the glass in the door, the centrepoid, *h*, being below the lantern, when pressed backward by the staff, the catch, *i*, will descend, and so liberate the door, as soon as the pressure can be removed from *h*, the catch will recover itself, and receive and hold again the door.

444.—William Davis, of Spencer Road, Stoke Newington, London, N., oil-refiner, for "*Improvements in increasing the illuminating effect of coal-gas, and other gases.*" Patent dated Feb. 19, 1862.

This invention relates to an improved mode of applying enriching or auxiliary agents, such as hydrocarbons, mixtures of hydrocarbons, hydrocarbonaceous substances, or carburetting materials to increase the illuminating effect of coal-gas, and other gases. For this purpose, the heat produced by the combustion under treatment is applied, that is, the gas whereof the illuminating effect is to be increased to generate vapour from the hydrocarbon or carburetting material, or enriching or auxiliary agent, that is to say, the said hydrocarbon or carburetting, enriching, or auxiliary agent is conveyed from its holder or receiver to a holder, receiver, or part situated so near to the burner where the gas under treatment is undergoing combustion, that the said hydrocarbon or carburetting, enriching, or auxiliary agent when arrived there shall have sufficient heat transmitted to it, from the burning gas, as to be caused to give off vapour which shall combine with the gas under treatment, and thereby increase its illuminating effect. The patentee wishes it to be understood that when hereinbefore or hereinafter, in this specification, he uses the term "gas under treatment," he intends the same to signify the coal-gas or other gas whereof the illuminating effect is to be increased. When the holder or receiver of the hydrocarbon, or carburetting, enriching, or auxiliary agent is below the burner, the mode preferred for raising the hydrocarbon or agent to the immediate neighbourhood of the burner, to be there evaporated, as described, is by the employment of capillary tubes, or worsted or cotton threads, or other capillary conductors or conveyors. The gas under treatment may be brought into contact with the carburetting or auxiliary agent while the latter is passing up its tubes, conductors, or conveyors, so as to take up a portion of such agent while the same is in a state of spontaneous or natural evaporation, and hence acquire increased illuminating power before reaching the burner. In order that the said hydrocarbon, or carburetting, or enriching agent may have an additional amount of heat transmitted to it, conductors or conveyors are sometimes coiled close to the burner, or the substance of the burner-tube is increased, or it is lined with fire-clay or other heat-retaining material. The patentee sometimes brings the hydrocarbon, or carburetting material, or auxiliary enriching agent, into the centre of the burner just below the part where the combustion of the gas under treatment is going on, so that the said hydrocarbon, or agent, may be evaporated or distilled close below the burning gas, with which it combines on emerging from its conductor or conveyor. The patentee regulates the quantity of the hydrocarbon, or carburetting auxiliary, or enriching agent, by regulating the capacity or number of the tubes, conveyors, conductors, or passages along which it is raised.

In performing the invention, the best mode of transmitting heat from the burning gas to the hydrocarbon, or enriching, or auxiliary agent, is by employing a pipe terminating in the burner and receiving heat from the burning gas, which heat is communicated by radiation to the hydrocarbon, or auxiliary, or enriching agent, raised to this part as described.

The claim is for—

1. Increasing the illuminating effect of coal-gas and other gases by means of hydrocarbons or carburetting materials, or enriching or auxiliary agents conveyed continuously from their receiver or holder, while the combustion of the gas under treatment is going on, to a receiver, holder, or part in such proximity to the burner at which the gas is undergoing combustion, that the heat produced by such combustion shall evolve vapours from the hydrocarbon or carburetting material or enriching or auxiliary agent, which vapours shall combine with the gas under treatment, and thereby increase its illuminating effect.

2. The mode of increasing the illuminating effect of gas by hydrocarbons or carburetting materials, or enriching or auxiliary agents, contained in a holder below the burner, from which holder they are gradually raised to the neighbourhood of the burner by capillary action, or other means, so that the heat transmitted from the burning gas shall evolve vapours from them, which combine with the gas, and increase its illuminating effect.

3. The mode of applying threads of cotton, or other fibrous material, for raising the hydrocarbon or carburetting material, or enriching or auxiliary agent, according to which the threads carried from the holder of the said hydrocarbons or agents, are coiled or wound in the neighbourhood of the burner for the purpose set forth.

4. The mode in which the hydrocarbon or carburetting material, or enriching agent, is raised to the centre of the burner, below the part where combustion is going on, so that it may give off vapours which combine with the burning gas, substantially as described.

484.—Marc Antoine François Mennons, of 39, Rue de l'Echiquier, Paris, for "*Improvements in burners for heating by gas.*" Patent dated Feb. 22, 1862.

This invention consists of an improved construction of gas-burner for general heating purposes, by means of which intense and perfect combustion is obtained, unaccompanied by the smoke, escapes, and other disadvantages, inherent to such apparatus as hitherto arranged.

A threaded metallic socket, which may be screwed to a pipe, pillar, or other setting, is fitted at the top with a common burner. A tube is fixed to the socket, and pierced with apertures for the admission of atmospheric air. The lower part of this tube is provided with a lining of coarse wire-gauze (about 14 meshes to the inch), by which the air is divided and freed from foreign matters in its passage through the apertures above noted. A sliding collar surrounds part of the tube, and is pierced to correspond with the apertures of the latter. This collar serves to regulate the admission of air by increasing or decreasing the area of the apertures, according to the requirements of the combustion. A small cone is fitted to the upper part of the tube by a bayonet, or other suitable joint, and a cap of metallic gauze (of about 25 meshes to the inch), adjusted in a metallic setting, is secured in position on the top of the tube by means of the cone. This gauze cap should be of a conical, undulating, or otherwise moulded form (not flat), so as to afford the necessary space for the passage of the gases, while adding to the energy of the draught. Another conical tube, formed of slightly oxidable metal, or other suitable matter, is set over the gauze cap in the upper part of the cone, beyond which it projects to the distance of about half an inch. A capsule of the same material, pierced at its centre with an orifice of about three-eighths of an inch in diameter, so as to confine the line of combustion when the flame is reduced. The diameter of this orifice may, of course, be varied according to the flame required.

The claim is for—

1. The application to gas-burners, for heating purposes, of a regulating apparatus, substantially as above specified, by means of which a due supply of atmospheric air may be mingled with the gas, and its introduction controlled according to the requirements of the combustion.

2. The application to such burners of a conical, undulating, or otherwise indented or moulded cap, or diaphragm, of metallic gauze, in manner and for the purpose substantially as herein set forth.

485.—William Johnston, of Glasgow, N.B., metal merchant, for "*Improvements in gas and other lamps and stoves.*" Patent dated Feb. 24, 1862.

A portion of the invention relates to lamps for illuminating shops, halls, stations, and other places, and which are of the kind comprising a number of gas-jets or other lights arrranged star-fashion, or in a circular or similar form, beneath, above, around, or partly around a central reflecting surface or combination of reflecting surfaces, and comprises various improvements in contriving, forming, shaping, or arranging the details of such lamps.

In one modification of the improved lamps, the central reflector is of a cylindrical form of uniform diameter or tapering slightly, being placed vertically and with the lights arranged round it.

An improvement applicable to the cylindrical reflector, and to reflectors of various other forms, consists in forming the reflecting surface with a series of flutings or so as to present an indented outline in section instead of the ordinary circular outline, and in disposing the lights so as to obtain a multiplication of reflections from such fittings.

According to another modification, reflectors are formed of any of the hereinbefore-mentioned shapes of transparent glass having a thin surface, coating or enamel of coloured or opaque glass. The glass is silvered internally and indentations are cut on the external surface through the coating or enamel so as to present ornamentally-shaped reflecting portions.

According to another part of the invention, in constructing reflectors of forms which are convex in general outline at the reflecting part, whereby the light is diffused and spread, instead of being concentrated on points as by concave reflectors, thereby making other parts appear darker by contrast.

Another portion of the invention relates to further modifications of the reflectors, and comprises various combinations of what may be termed "geometrical" reflectors. In one simple arrangement, two flat reflecting surfaces are fitted angularly together, and are disposed so that a flame presented at or near the angle, will produce a multiplied appearance on the principle of the kaleidoscope.

Another part of the invention consists in imparting a rotary motion in the case of gas-jets used for heating purposes, as in stoves.

The claim is for the contriving, forming, shaping, or arranging of the details of lamps and of gas-stove burners, substantially according to the improved modes hereinbefore described.

495.—Lewis Davis, of Glo'ster Gardens, Hyde Park, London, W., Esquire, and Frederick Major Parkes, of Marylebone Road, London, N.W., gentleman, for "*An improvement in the production or manufacture of gas for lighting and heating.*" Patent dated Feb. 24, 1862.

This invention has for object an improvement in the production or manufacture of gas for lighting and heating, and consists in producing or obtaining gas from the substance known as petroleum, or rock-oil (and which bears many other names), by subjecting it (preferably in its crude state, that is to say, without previous purification,) to considerable heat in a retort, or like receptacle, until gas is obtained from it. This gas is generally passed through a condenser. The patentees sometimes employ a vertical retort, constructed double, so that the petroleum may be subjected to a high temperature at two rapidly succeeding intervals. The gas so produced is capable of being stored in a gaseous state for a greater or less time, and afterwards of being conveyed and distributed in a gaseous state for lighting and heating purposes in the same way as the common coal-gas now is. Having thus set forth the nature of the invention, the patentees proceed to describe the best means for carrying the same into practical effect.

A shallow retort, furnished with two pipes, is used, one for feeding the petroleum into the retort, and the other for carrying off its gaseous products into the hydraulic main. The retort is placed in a furnace of the ordinary construction used in gas-works, and, after having been heated, is charged with petroleum, whereupon gas will be evolved. (The heat we prefer is from 1700° to 2000° Fahrenheit.) This gas passes through the hydraulic main into ordinary condensers and purifiers, supplied with lime and water, or other known agents for purifying gas, and thence into a gasholder. Instead of a shallow retort, a tube, closed at both ends, and bent or rounded in the centre, is sometimes used. This tube is set in the furnace in an inclined position, and so that both the ends are on the same level, while the bend is downwards. The tube is wholly enclosed in the furnace except at the bend and ends, which are outside it, and a feed-pipe is connected to one of the ends, through which the tube is fed with petroleum, which descends by its own gravity along the limb of the tube towards the bend, and is exposed in passing to a heat of from 1700° to 2000° Fahrenheit, whereby a gaseous product is given off. This passes through the bend and rises into the other limb of the tube, where it meets the same temperature as in the first limb, and travels in a gaseous state to the upper part, or end of the limb, whence it passes into the hydraulic

main and purifiers. The gas is thus subjected to a high temperature at two rapidly succeeding intervals. A similar effect may be produced by using a double vertical retort, consisting of two chambers, communicating by a bent pipe. The petroleum is fed into one of the chambers, and the gas given off from it passes through the communicating pipe into the second chamber, and, being while therein again subjected to the full furnace heat, passes off in gas into the hydraulic main.

The claim is for the manufacture or production of a gas from petroleum, in a retort or similar receptacle, by subjecting it (the petroleum) to the action of heat, which gas shall be capable of being stored and conveyed and distributed in a gaseous state for lighting and heating purposes, in the same way as the common coal-gas now is.

499.—JOHN CARNABY, of 7A, Skinner Street, London, for "*Improvements in turning, managing, and regulating the taps and valves of Gas pipes.*" Patent dated Feb. 25, 1862.

This invention consists in attaching to the plug of the main-cock a bar of metal, at each end of which a cord is fastened. This cord is made to extend, by passing it over pulleys, &c., to the point at which it is desired to be able to regulate the flow of gas. It is there wound round a wheel, part of which is cogged, and which gears into a pinion fitted with a handle. Upon turning the handle, the cord is released from the wheel on one side while it is taken up on the other, and this action is, of course, extended to the arm of metal attached to the main-cock, the adjustment of which regulates the supply.

513.—PIERRE JOSEPH GUYET, of Paris, civil engineer, for "*Improved coupling for uniting pipes between locomotives and tenders, applicable also to the coupling of other pipes.*" Provisional protection only obtained. Dated Feb. 25, 1862.

This coupling is intended principally to be applied to the connection of the pipes between locomotives and tenders; it is, however, equally fitted for other connections of steam, gas, and water-pipes. The more distinctive features of this invention are the peculiar arrangement and special fitting of elastic stuffing, whereby tight and sound sliding-joints are obtained, which at the same time allow of the pipes sliding or standing at an angle, as well as in a line with the coupling.

The coupling is formed by using a sliding collar with flanged ends, and attached to which, by means of bolts, are two flanges, one at each end. Between these flanges and the flanges of the collar, are inserted rings of india-rubber, which, upon the bolts being screwed up, are compressed against the two pipes, between which a junction is intended to be formed. A tight and flexible joint is thus formed.

523.—THOMAS KING and ROBERT VARVILL, merchants, both of Liverpool, Lancashire, for "*Improvements in apparatus for controlling the flow of fluids for flushing water-closets.*" Patent dated Feb. 26, 1862.

This invention relates to the apparatus immediately in connection with the cistern obtaining the flushing fluids, and though applicable to all cisterns, is especially so in large towns, where a small or intermediate cistern is supplied from the street-mains, or from a cistern at an elevation; the object being to prevent the waste of the said flushing fluids.

To the ordinary connections of the hand-lift, or pressure-seat, arrangements, a lever, which is carried into the cistern, is jointed, or otherwise connected, and balanced, or supported, on the end of the horizontal plug, or barrel of a tap, fitted to the supply-pipe. On the other end of this lever is affixed the float, and between the said tap and float is attached a chain, or lever, which reaches to, or near to, the bottom of the cistern, and operates the outflow, or flushing-valve. The overflow-pipe is cast with the cistern, and communicates with the flushing, or waste-pipe, in the usual way.

By this arrangement it will be seen that, when the part of the lever outside the cistern is acted on, the float will be raised, the supply-tap shut, and the outflow, or flushing-valve, opened; but as soon as the lift, or pressure-seat, is left at freedom, the float falls, and opens the supply-tap until such time as the cistern is again filled; thus preventing more than the quantity contained in the cistern from being used by one movement.

The claim is for the arrangement of apparatus herein described.

555.—JAMES SIM, of Aberdeen, manufacturing chemist, for "*Improvements in the construction of gas-meters.*" Patent dated March 1, 1862.

This invention relates to certain improvements applicable to the construction of wet gas-meters, the principle upon which it is chiefly founded being that of causing the gas to pass over, or come in contact with, an extended surface of water, in a separate vessel, or vessels, whereby it takes up and absorbs, or becomes saturated with, moisture, previous to being admitted into the measuring-compartment of the meter, and thus preventing the absorption of the water contained therein by the gas, as is the case when the latter is introduced in a dry state, the effect of such absorption necessarily being to alter the level of the water contained in the measuring-compartment. The water contained in the separate vessel, or vessels, is also constantly evaporating, the results of such evaporation passing upwards into the measuring-compartment, and thus assisting in preserving the water-level therein.

In constructing a meter in accordance with this invention, the front box thereof is divided into two compartments, one above the other, the upper compartment containing the usual arrangements of valve, float, index, spindle, with the necessary gearing to the measuring-cylinder or drum, the pipe for supplying water to the meter, and also the syphon overflow-pipe, hereinafter mentioned, for adjusting the water-line of the meter, while the lower compartment is used as a cistern or reservoir for holding water, the same being provided with an overflow-pipe for the exit of any surplus water which may have been admitted thereto.

According to one modification of this invention, the lower compartment is constructed with one cistern or reservoir therein, or, if desired, it may be divided into compartments, it being essential, however, that such compartments should communicate with each other, so that the gas may freely pass through the same for the purpose of traversing the surface of the water. The gas having been admitted by the inlet-pipe through the valve box, is carried by means of a tube into the cistern or reservoir, where it comes into contact with the water, and, passing along its surface, absorbs some portion thereof, and is conveyed in a hydrated state into the hollow covering of the measuring cylinder or drum. Any surplus water thus carried into the measuring compartment of the meter may be returned to the cistern or reservoir by a syphon attached to the inlet-pipe before the latter enters the hollow covering of the measuring cylinder or drum, the head of which syphon-pipe being the water-line of the meter. In filling the meter with water, it rises in the syphon-pipe, overflows the head, and runs down the lower part of the inlet-pipe into the cistern or reservoir. The said syphon-pipe thus furnishes a convenient mode of carrying off any water which may be set free from the hydrated gas in the measuring compartment, or which may be the result of evaporation from the cistern or reservoir, and constitutes an effectual method of adjusting the water level of the meter, and keeping it at the water-line thereof under ordinary circumstances.

In another modification of this invention the front box of the meter is divided, as before mentioned, into two compartments, the lower compartment containing two cisterns or reservoirs for holding water, one being placed over the other, sufficient space being left between them for the passage of the gas. In this arrangement, the gas passes by the inlet-pipe to the lower of the two cisterns or reservoirs, and thence along the surface of the water through a pipe or passage to the upper cistern or reservoir, and, after passing along the surface of the water contained therein, is conveyed by a suitable inlet-pipe into the measuring cylinder or drum of the weter, the surplns water being allowed to return to the cisterns or reservoirs by a syphon-pipe inserted into the said inlet-pipe, as hereinbefore mentioned.

In order still further to increase the efficiency of these arrangements, the water in the lower compartment of the meter may be contained in trays ranged one above another, and supported upon suitable lugs, or brackets, in the interior of the lower compartment of the front of the meter, such trays being filled when the meter is supplied with water.

To prevent the consequences of the meter being tilted, the outlet-pipe may be placed in the upper compartment of the front box, and carried down as near to the water-line of the meter as possible, so as only to leave space sufficient to permit the gas to enter the tube.

It will be seen that the gas passing over the surface of, or coming in contact with, the water in the cisterns, or reservoirs, becomes more or less hydrated, or saturated with moisture; and when admitted in that state into the measuring-chamber, is incapable of absorbing or taking up any further quantity of water in the measuring-chamber, and thereby lowering the level thereof, which would be the case if the gas were introduced into the measuring-chamber in a dry, or less hydrous or hydrated, state; and that not only the waste of water in the measuring-chamber may thus be prevented, but its quantity may be increased by the water which may be given off, or set free, from the hydrated gas in the measuring-chamber, or which may result from evaporation from the water contained in the cisterns or reservoirs. The water-line is thus preserved and kept uniform, which feature is of great importance in giving a correct registration of the quantity of gas passing through the water.

The claim is for—

1. The construction and arrangement of the said syphon overflow-pipe, as and for the purposes hereinbefore mentioned.

2. The arrangements and combinations of apparatus and mechanism in the construction of gas-meters, hereinbefore substantially described, or any mere modifications thereof, for effecting the objects and purposes hereinbefore mentioned and set forth.

559.—PIERRE JOSEPH GUYET, of Paris, civil engineer, for "*Improvements in taps or valves.*" Provisional protection only obtained. Dated March 1, 1862.

The distinctive features of this invention consist in the arrangements for the elastic seatings and packings, together with the general arrangement of the whole apparatus, whereby tightness of the joints and packings, whatever be the pressure of the water or fluid, is maintained, and whereby the taps are made to work easy under the most severe pressure.

The body of the tap is composed of three parts bolted together, the joints being made tight with india-rubber ring-joints compressed in a recess. One of the parts is composed of a longitudinal box, terminating in two packings, and has a flange which runs along the inside of the body. The upper surface of the valve is composed of two semi-circular discs, cast with a longitudinal eye, their surface being formed of two semi-circular india-rubber joint-rings compressed in recesses by semi-circular plates bolted on the discs. A wrought iron shaft passes through a packing and the eyes of the two discs. The valve is set in motion through the shaft secured to the discs. The shaft receives on one of its ends a lever, by which, and by means of a regulating screw supported by cast iron frames bolted on the flange of the body of the tap, the motion is transmitted. The shaft may be worked with equal facility by a worm-wheel and screw, or by any other means of applying motion. By the disposition of the packings, any loss of water or any communication between the two compartments of the tap is prevented. The valves are equally balanced, for the pressure of the water acts on the upper surface of one and upon the under surface of the other, the valves being fixed upon the same shaft.

A modification of the above valve is thus described. The body of the tap is fitted with two cross-pipes, for forming connexions with the water-pipes, one of which communicates with the inside of the body by two openings. The body is made tight at top by a cover fitted with a packing-box, and at the bottom by a ribbed cover. A flange is cast within the tap, which holds an elastic ring. This, together with a similar ring, form the seatings for the two valves, which are cast with a hollow shaft, the upper part of which passes through a packing, and the lower part through a three-armed eye cast with a flange. The bottom of the shaft is stopped by a stopper screwed in it. In the upper part of the shaft is fixed a brass nut, screwed upon a regulating-screw, free to move in the head of the frame bolted upon the cover. This screw is worked by ordinary means. When the communication is interrupted between the two pipes, the water presses upon the upper side of one valve and the under side of the other; thus making a perfect balance in the valve-shaft, which is, therefore, totally independent of the pressure inside the pipes, or the diameters of the valves.

## APPLICATIONS FOR LETTERS PATENT.

2952.—William Jenkins, of Troedy Rhiw, Merthyr Tydvil, Glamorgan, viewer, for "*An improved mode of, and apparatus for, cutting coal.*" Oct. 31, 1862.

2961.—James Winter, the younger, of Wardour Street, Soho, London, W., for "*An improved safety-tap or cock, applicable to gas-burners, gas-pipes, and vessels containing gas, also water-pipes, steam-pipes, and vessels containing inflammable and other liquids, compressed air, and spirituous liquors.*" Nov. 1, 1862.

2963.—James Musgrave, of the Globe Iron-Works, Bolton-le-Moors, Lancashire, for "*Improvements in the valves of steam-hammers, and steam hydraulic and gas-engines.*" Nov. 3, 1862.

2966.—Frederick Trachsel, chemical engineer, and Thomas Clayton, machinist, both of Manchester, Lancashire, for "*Improvements in machinery or apparatus for obtaining light, heat, and ventilation, parts of which improvements are also applicable to other purposes.*" Nov. 3, 1862.

2968.—Edward Humphrys, of Deptford, Kent, for "*Improvements in the construction of centrifugal pumps.*" Nov. 3, 1862.

2993.—Richard Archibald Brooman, of 166, Fleet Street, London, E.C., for "*Improvements in commodes or water-closets.*" A communication. Nov. 5, 1862.

2994.—Richard Archibald Brooman, of 166, Fleet Street, London, E.C., for "*Improvements in taps or cocks.*" A communication. Nov. 5, 1862.

3001.—Jules Joseph Laveissière, of 58, Rue de la Verrerie, Paris, merchant, for "*Improvements in the manufacture of tubes of copper, or other metals or alloys.*" Nov. 5, 1862.

3004.—William Edward Gedge, of 4, Wellington Street, Strand, London, W.C., patent agent, for "*An improved lift and force-pump.*" A communication. Nov. 6, 1862.

3041.—Edward Marriott, of Miles Platting, Manchester, Lancashire, manufacturing chemist, and Samuel Holroyd, of Manchester, aforesaid, manufacturing chemist, for "*Improvements in the purification of gas, and in obtaining certain useful products therefrom.*" Nov. 11, 1862.

3058.—Moss Defries, of the firm of Jonas Defries and Sons, of Houndsditch, London, N.E., for "*Improvements in the manufacture or construction of lamps.*" Nov. 13, 1862.

## GRANTS OF PROVISIONAL PROTECTION.

1958.—James M'Geary, of Salem, Massachusetts, U.S.A., now residing at Bayham Terrace, London, N.W., for "*Improvements in the manufacture of gas, and the apparatus to be employed for that purpose.*" Part communication. July 7, 1862.

2373.—John Ambrose Coffey, of 4, Providence Row, Finsbury Square, London, E.C., and Theophilus Redwood, of 19, Montague Street, Russell Square, London, W.C., for "*Improvements in the manufacture of salts of ammonia and other products from the ammoniacal liquors of gas-works, and animal charcoal works, and in the still or apparatus to be used in such manufacture.*" Aug. 27, 1862.

2846.—Henry Herman Kromschroeder and John Frederick Gustav Kromschroeder, both of Princess Terrace, Regent's Park, London, N.W., for "*Improvements in the manufacture of gas-meters, and in the manufacture of sheet metal suitable for gas-meters.*" Oct. 22, 1862.

2952.—William Jenkins, of Troedy Rhiw, Merthyr Tydvil, Glamorgan, viewer, for "*An improved mode of, and apparatus for, cutting coal.*" Oct. 31, 1862.

2968.—Edward Humphrys, of Deptford, Kent, for "*Improvements in the construction of centrifugal pumps.*" Nov. 3, 1862.

2994.—Richard Archibald Brooman, of 166, Fleet Street, London, E.C., for "*Improvements in taps or cocks.*" A communication. Nov. 5, 1862.

3004.—William Edward Gedge, of 11, Wellington Street, Strand, London, W.C., for "*An improved lift and force pump.*" A communication. Nov. 6, 1862.

## NOTICES TO PROCEED.

1876.—John Parkes, of London Street, Paddington, London, W., gas engineer, for "*Improvements in gas-lanterns.*" June 26, 1862.

1905.—Joseph Wall, plumber, and Thomas Dodd, glass merchant, both of Liverpool, Lancashire, for "*Improvements in taps for controlling the flow or passage of fluids.*" June 30, 1862.

1920.—Jesse Greenhalgh, of Hyde, Lancashire, mechanic, and James Greenhalgh, of Audenshaw, Lancashire, farmer, for "*An improved diminishing valve, and also a water or steam-escape apparatus to give alarm in case of fire, and to assist in quenching the same.*" July 1, 1862.

1932.—John Steel, of Stirling, N.B., for "*Improvements in water-closets.*" July 2, 1862.

1953.—Arthur Warner, of 31, Threadneedle Street, London, E.C., for "*Improvements in preparing materials for, and in purifying coal-gas.*" July 5, 1862.

1961.—John Henry Johnson, of 47, Lincoln's Inn Fields, London, W.C., and of 166, Buchanan Street, Glasgow, N.B., for "*Improvements in wet gas-meters.*" A communication. July 8, 1862.

2373.—John Ambrose Coffey, of 4, Providence Row, Finsbury Square, London, E.C., and Theophilus Redwood, of 19, Montague Street, Russell Square, London, W.C., for, "*Improvements in the manufacture of salts of ammonia, and other products from the ammoniacal liquors of gas-works, and animal charcoal works, and in the still or apparatus to be used in such manufacture.*" Aug. 27, 1862.

2571.—Johan Bernhard Giertz, of Great Saint Helen's, London, E.C., for "*Improvements in gas-burners or jets.*" Sept. 19, 1862.

2805.—Jonah Davies, of Tipton, Staffordshire, ironfounder and engineer, and George Davies, of Tipton, aforesaid, ironfounder and engineer, for "*Improvements in rotary engines, rotary pumps, and rotary blowing-machines.*" Oct. 17, 1862.

# Legal Intelligence.

## COURT OF CHANCERY.

November 6, 1862.

(*Before the* Lord Chancellor.)

### HILLS v. THE LIVERPOOL UNITED GAS LIGHT COMPANY.

This appeal came from Vice-Chancellor Wood. The plaintiff is the well-known patentee of the process for the purifying of gas, and has been for many years past engaged in litigation in the courts of law and equity for establishing his patent, and protecting it from infringement, in which it may be said he has substantially succeeded. The infringement complained of by the plaintiff in the present case was the user by the defendants of a certain material called "bog ochre" in the purifying of their gas, and the renovating or reoxidizing of such material, so as to render it capable of being used over and over again. The contention on behalf of the defendants was, that they had been guilty of no infringement of the plaintiff's patent, inasmuch as the bog ochre used by them was a natural oxide, and all the decisions establishing the validity of the patent had proceeded upon the hypothesis that the plaintiff's process was confined to the use of artificial oxides only. For the plaintiff it was urged that the phraseology of his specification was intended to include natural as well as artificial oxides, and that the material used by the defendants was a precipitated oxide, according to the meaning of the plaintiff's patent; and, further, that the revivifying process of the defendants was a hydrated oxide, as mentioned in the plaintiff's specification. The Vice-Chancellor granted an injunction generally prohibiting the defendants from using the material called bog ochre in the purifying of their gas, and from renovating or reoxidizing the same, and from this decision the defendants appealed. When the appeal came first before this court, his lordship held that the injunction, as granted by the court below, could not stand, as it was founded on a misapprehension of the meaning of the plaintiff's patent, but he at the same time entertained a doubt whether the material used by the defendants came within the term "precipitated oxide" in the plaintiff's specification, or the revivifying process constituted a hydrated oxide as therein mentioned. Upon these grounds, judgment was reserved.

Mr. Rolt, Mr. Grove (of the Common Law Bar), and Mr. Marten, were for the plaintiff; Sir H. Cairns and Mr. Druce for the defendants.

The Lord Chancellor, in delivering judgment, said: The first question I have to decide is, whether the application by the defendants to the purification of gas of a certain natural substance called bog ochre, be or not an infringement of the plaintiff's patent? The plaintiff insists that it is, and he affirms that bog ochre contains a large quantity of precipitated oxide of iron, and that the application of precipitated oxide of iron from any source obtained, be it natural or artifical, pure or combined with other substances, is a violation of his patent. The defendants deny that the material in question does contain precipitated oxide of iron; but, if it does, they insist that it is a native or natural, and not an artificial oxide; and, they contend, that according to the true construction of the plaintiff's specification, and the judicial interpretation it has received, the patent is limited to the application of such oxides only as are prepared or obtained by some artificial means. The construction of the plaintiff's specification in this cause must be the same as that which was given to it in the former case of *Hills v. Evans*, in which the validity of the patent was established. It is material to state how and why the patent was held to be valid. It was impugned upon the ground of want of novelty. Specifications of older patents were produced, in which various statements were found as to the applicability of the oxide of iron to the purification of gas, and it was insisted that the plaintiff's discovery was thereby anticipated. But the plaintiff's patent was supported on the ground that these earlier descriptions were too general, comprehending, as they did, materials that would purify, and materials that would not purify; whence the reader of such former specifications, was still left under the necessity of ascertaining by experiment and further discovery, what was the exact description of the purifying agent. This appears to be done by the plaintiff's specification, and the validity of his patent was, therefore, established. But the plaintiff's objection to these former specifications was, in the former case, retorted against himself. In his specification he describes the purifying agents he employs as the hydrated or precipitated oxides of iron; and, in one place, he uses the words "precipitated or hydrated oxides." Now, it appeared from the evidence in *Hills v. Evans*, which evidence is always admissible, to show what external objects are denoted by terms of art, that of the hydrated oxides of iron, some were native—that is, formed in the laboratory of nature—and some were artificial—that is, made or resulting from some intervention of human agency. Of the native or naturally-formed oxides of iron, some are efficient for the purification of gas, and some will not serve that purpose. Again: of hydrated oxides of iron, some are formed by precipitation, and some, so far as we know, are not so formed; but, according to the then state of the evidence, it appeared that all the known precipitated oxides of iron are artificial, and are hydrated. It was objected, therefore, that, inasmuch as the plaintiff used the term hydrated oxides without limitation, thereby embracing both native hydrated oxides, that would not answer the purpose, and the artificial hydrated oxides that would, the specification was too general, and the patent void. In answer to that objection, I held that, having regard to the whole of the specification, the plaintiff had described and meant to include such oxides only, whether merely hydrated or hydrated and precipitated, as were prepared or obtained by artificial means. Upon a more accurate examination of the judgment of the Court of Exchequer, I find that, in reality, the same conclusion was drawn by the learned judges of that court. This is apparent, from the following passage, in page 368 of the 5th volume of Hurlston and Norman's report of the case. Say the learned judges: "The next objection was, that the plaintiff's specification was insufficient, on this ground: he says—'I use the hydrated or precipitated oxides.' It was said that included all hydrated oxides; and, inasmuch as some of the natural hydrated oxides would not do, the plaintiff's specification was bad. Now that question turns upon this: If the plaintiff, in his specification, means all the hydrated oxides, it is open to that objection; but, if he means only those hydrated oxides which are also precipitated—that is, the artificial hydrated oxides, it is not open to that objection." The important words in the passage which I have read are the explanation given of the precipitated oxides by the words "that is the artificial hydrated oxides." The reasoning of the Court of Exchequer seems to have been this: Precipitated oxides and artificial hydrated oxides, say the court, are the same thing. We find that the plaintiff meant to describe such hydrated oxides only as are artificial; therefore, he meant such hydrated oxides only as are precipitates. With much of the observations of the Court of Exchequer, I cannot concur; but I do concur in the conclusion

that, by the terms hydrated or precipitated oxides, the plaintiff intended to denote such oxides only as were artificially prepared or obtained. But, this is not the character of the bog ochre as it is primarily, and in the first instance, employed by the defendants. The ochre is used by the defendants, in the first instance, in its principal natural state as dug from the bog; and, even if it be, as the plaintiff affirms, a hydrated oxide of iron formed by precipitation, it is clear that it is a native—that is, a naturally-formed oxide; and, whilst used in that state, must, by the very conditions upon which the plaintiff's patent was supported, be held not to be included in the plaintiff's specification. I cannot, therefore, grant any injunction to restrain the defendants from using this bog ochre in its primitive or natural state. The more material question still remains. The principal impurity from which it is desirable to cleanse the gas is sulphuretted hydrogen. The hydrated oxide of iron effects this by attracting the sulphur which combines with the iron, while the oxygen of the oxides uniting with the hydrogen water is formed, and thus the sulphuretted hydrogen disappears by being resolved into its constituent elements, which enter into new combinations. The chemical combination of the sulphur with the oxide of iron forms a new chemical substance called sulphuret of iron, which is inert and useless for purification. But the plaintiff discovered that, when the sulphuret of iron is exposed to the atmosphere in such a manner as to cause the atmospheric air thoroughly to permeate and pervade the mass, the sulphur is driven off and precipitated; the iron is reoxidized by taking up new oxygen from the air, and thus a new hydrated oxide is by this application of a natural agent artificially obtained. It is material to observe that by this process, directed by human agency, a new purifying material is prepared. It is not as if the air merely freed the iron of the integument of sulphur, which coating of the oxide obstructed the exercise of its still inherent power; but the facts are, that the sulphur, being chemically and not mechanically combined with the oxide, the latter is converted into a sulphuret, and it is by the subsequent accession of a new oxygen that it is re-converted into a new oxide. This new oxide I hold to be an oxide artificially prepared or obtained, although it is the result of the natural properties of the air, because those properties are guided and directed to attain this end by human agency and design. Upon all this the evidence in the cause is without contradiction or dispute. The defendants admit that when the bog ochre, in its natural state, has been so long used as to become inert, it is revivified and restored by the use of the process described in the plaintiff's specification; and in that secondary state again applied to the purification of gas. I hold, therefore, that while the defendants employ the bog ochre in its natural state, they use a native oxide of iron, which, whether it be hydrated only, or hydrated and precipitated, is not within the plaintiff's patent, and no injunction can be granted against the use of it; but that when they use the ochre after it has been reoxidized, they use a material which is within the plaintiff's patent, being an artificial hydrated oxide, and this I restrain them from employing. The Vice-Chancellor granted an injunction to restrain the defendants from using the plaintiff's process or invention of reoxidization. I cannot grant any such injunction, because the plaintiff specifies and claims that process or discovery as applicable only to the renovating the purifying materials he describes; that is, the hydrates or precipitated oxides which are within his patent; and, if this ochre be not one of such oxides, as I hold it to be not, the revivification of it is not within the plaintiff's specification. In fact, it is only by the defendants using that process, or some other process of renovation, that the bog ochre is brought into the condition of being one of the plaintiff's patented purifying materials—that is, a hydrated or precipitated oxide artifically prepared or obtained. Therefore, declare that the user, by the defendants, of the bog ochre employed by them in the purification of gas, so long as the same is used in its native state or condition, is not an infringement of the plaintiff's patent; but, that the user of the same material in the purification of gas, after it has been reoxidized or renovated by the means described in the plaintiff's patent, or by any other means, is an infringement of the plaintiff's patent, and ought be restrained by injunction, and restrain the same accordingly. Direct an account of all the bog ochre that has been employed or used by the defendants, in the purification of gas, in any other than its native or primitive state, and of the gains and profits that have resulted from such user or employment with all usual directions. And, having regard to the failure of the case partially on the part of the plaintiff, and the failure of the defence partially on the part of the defendants, I give no costs to either side.

Mr. GROVE: If your lordship will permit me, there is upon the bill an admission of the user to a considerable extent of a process not involving the bog ochre, which was discussed in the previous case; and I should ask your lordship, with submission, whether the account would extend to that? Upon the bill they state, previously to their using the bog ochre, they had used certain quantities of an artificially-prepared material, in the same manner as was referred to in the previous injunction, by precipitation. I do not know whether the account would extend to that?

The LORD CHANCELLOR: No point of that kind was brought to my attention. There can be no question that you are entitled to relief in respect of that; but you will remember that the whole tenour of the argument before me was limited entirely to the employment of this bog ochre.

Mr. GROVE: The bog ochre, no doubt, was the contested point, but the fact was mentioned in the course of the argument, that they had used the other.

The LORD CHANCELLOR: If I gave this remedy against them *quoad* the bog ochre, *à fortiori*, I ought to give it with respect to an artificial hydrated oxide; but that must be subject to any observations by the other side, in case they desire to have that point spoken to.

Mr. DRUCE: It appears that my friend is right in saying there is a limited admission of the use of some; but there is also a statement that a great portion of that which we used was anhydrous, and therefore the account would be strictly an account in respect of precipitated or hydrated oxides within the terms of the plaintiff's specification, so as to enable us to exclude the use of the anhydrous. Your lordship would probably in this case, as in the other, prevent the injunction coming into operation for six weeks, because the company are bound to supply gas by the Act of Parliament, and, unless a certain time were given, the town would be left in darkness.

The LORD CHANCELLOR: I should think the plaintiff would gladly accede to that, because, of course, he gets the profit during the time.

Mr. GROVE: Certainly.

The LORD CHANCELLOR: I have no doubt, on the one side and on the other, every reasonable attention will be given to such matters as concern the public interests, and also the reasonable action of the parties.

Mr. DRUCE: My lord, I am told that two months would not be too long to effect an entire change of process.

Mr. GROVE: Anything that your lordship thinks right.

The LORD CHANCELLOR: I think two months will do that.

## VICE-CHANCELLOR'S COURT.

(*Before Vice-Chancellor* STUART.)

FRIDAY, NOV. 14.

### YOUNG *v.* FERNIE.

Sir HUGH CAIRNS (with whom were Mr. KARSLAKE and Mr. LAWSON) said in this case, he had to apply to his honour for an injunction to restrain the infringement of a patent, of which the plaintiffs were the proprietors. The date of the patent in question was the 17th of October, 1850; so that it was now in its thirteenth year; and the title was "For improvements in the treatment of certain bituminous mineral substances; and in obtaining products therefrom;" and the nature of this patent could be described in a very few words. Of course, the distillation of coal, for the purpose of producing light, was very old; but the court was, no doubt, aware that the great object hitherto in distillation of coal had been to produce gas for the purpose of illumination. It had been perfectly well known, ever since the distillation of gas was undertaken, that, in the course of the distillation of gas, when the mass of coal was enclosed in a retort, and subjected to the action of heat, not only would gas be produced in that process of distillation, but there also came two other matters—tar, called coal-tar, and a product called either naphtha or naphthaline. The object was to get the greatest quantity of gas as soon as possible; and that was not done by heating the retort rapidly. It appeared that somewhere about 1830, a well-known German chemist (Reicenbach) discovered, in the course of distillation of other matters, a certain product, to which he gave the somewhat fancy name of paraffin, which, when arrived at, was a white opaque substance. Mr. Reicenbach found it in the course of the distillation of beech-wood and some other matters; he found it in very small quantities; and he treated it more as a curiosity than as an article that could be made an article of sale or commerce to other persons. It was also known, after that time, that coal-tar, which was arrived at in making gas, contained small quantities of paraffin, which could be got at by redistilling the tar; but no person, until the present patent was taken out, was able to produce paraffin in any quantities to make it a merchantable or marketable article, or understood that it could be made an article of great value, for the purpose of illumination. The discovery of Mr. Young was this: he took a quantity of coals, and he found that if, in place of aiming at the application of the greatest quantity of heat to the retort, and keeping it at the greatest heat, you were satisfied to apply the smallest quantity of heat, which would be sufficient for the purpose of distillation, you would obtain, indeed, gas; but it was extremely valuable in another way, as containing a very pure and perfect oil, containing in it a very great quantity of this paraffin; and Mr. Young found that, if you applied heat no greater than would heat the retort to what is called a low red heat, making that the maximum, in the course of heating up to that, you would get this paraffin and paraffin oil; and that you would conduct the process in the best and most economical way, if you could stop short of that red heat. You would get the more oil and the more paraffin in the oil. Therefore, having arrived at this very remarkable discovery, Mr. Young took out a patent for what was, in fact, a patent for this distillation of coal in a way to produce oil, to which he gave the name of paraffin oil, on account of its containing a great quantity of paraffin. The patent went on to say that if you desired not to use this oil in the form in which it was used—which was extremely useful both for illumination and for the lubrication of machinery—but to extract from it the paraffin in a solid form, you might distil oil a second time, and get out the paraffin in a solid form, for the purpose of making candles, or any other thing you desired to make. The discovery when made attracted great public attention, and was held out to the world in the most conspicuous way, as a discovery of great value; so that there was not only very great enjoyment of the patent, but it was engaged by Mr. Young and his partners, under circumstances which attracted public attention to it; and the public would have been extremely anxious to have competed with him in the enjoyment of the manufacture, if the patent had not prevented it. The patent being dated in 1850, in the year 1851, at the Exhibition which took place in London, Mr. Young exhibited results of his discovery; and every public notice was taken of those results, and of the products which he exhibited. The *Times* newspaper called public attention to it in a very marked manner. Mr. Young's discovery was put into practice by himself and his partners, and a patent was taken out also for Scotland and for Ireland. In the year 1853, the first infringement which was known of it took place, and became the subject of litigation. It appeared that a company called the Hydrocarbon Gas Company was discovered to be infringing the patent, and proceedings were taken against them. A bill was filed; the patent being young, it was retained, and an action was tried at Westminster, in 1854, in which the plaintiff obtained a verdict. Counsel for defendants tendered a bill of exceptions; but that was abandoned, and the defendant obtained from the court of Queen's Bench a rule *nisi*, calling upon the plaintiff to show cause why a new trial should not be had upon the ground of the verdict being against evidence and misdirection. Before any cause was shown against that rule, a compromise was come to between the parties; and the defendants, who were manufacturing oil, as was alleged, in violation of the patent, agreed to give up the manufacture. They were, however, the proprietors of a patent for the manufacture of gas of considerable value, and it was made part of the same compromise that they should give to the plaintiffs, Mr. Young and his partners, or one of them, a licence to use the invention comprised in the letters patent belonging to the company, for a certain district round St. Paul's, for £3000. Accordingly, the Hydrocarbon Company gave up their manufacture of oil, and the present plaintiffs became the proprietors by purchase of the patent from them. Then, the next litigation that took place was one that went to very great extent, and was determined in a manner which the court, no doubt, would think entitled the plaintiffs to say that they had established, in the fullest way, the validity of the patent at law. In 1858, there was a company in Scotland, called the Clydesdale Chemical Company. It was discovered that they were infringing the patent; an action was commenced in the Court of Session, in Scotland, against the company, by the present plaintiffs. By their plea, the defendants denied the novelty of the invention, and the validity of the letters patent. The trial took place at Edinburgh, before the Lord Justice General, on six days in the month of November, 1860. There were the usual points raised with regard to the validity of the patent. A number of witnesses were examined, including all the eminent chemists, and the result was that the jury found a verdict for the plaintiffs on all the issues. The defendants, the Clydesdale Company, lodged a bill of exceptions, raising certain points of law before the court; that bill of exceptions was set down, and was to be argued in the month of January, 1861. Before it came on to be heard, the Clydesdale Company agreed to pay to the plaintiffs, and did pay to the plaintiffs, the sum of £7500 in full, of damages which the plaintiffs had sustained; and the Clydesdale Company agreed unconditionally to withdraw their bill of exceptions, and to submit to judg-

ment. They further agreed to take, and did take, from the plaintiffs a licence to manufacture the oil, paying a very considerable royalty to the plaintiffs. Since that judgment had been obtained, the Clydesdale Company had paid, under their licence, royalties to the amount of £8000; so that, the damages obtained in the action and the royalties amounted to upwards of £15,000 When the court found the result of such a long trial, when everything which could be discovered was brought forward, was that the Clydesdale Company were of opinion that the plaintiffs patent could no longer be impugned or resisted, it would surely say that the validity of the patent had been established at law. In the year 1861, another infringement was discovered in Scotland, and the infringers were the firm of Miller and Co., of Aberdeen and Glasgow. An action was brought against that firm, and they submitted, and paid £5000 for damages and royalties; and they took licences to use the invention of the plaintiffs. The present defendant alleged as a reason why he did not accept a licence from the plaintiffs was, that he considered a royalty of 4d. per gallon too exorbitant. He applied for a licence, and refused to accept it on those terms, although they were the terms upon which Messrs. Miller were content to settle the action against them. Then, in the year 1861, whilst the plaintiffs were prosecuting inquiries for the purpose of procuring evidence to be used at the trial of the action against the Clydesdale Company, they became aware that persons of the name of Humphreys were selling paraffin, in violation of their patent rights; and, in February, 1861, prepared a bill to be filed against Messrs. Humphreys, and praying for an injunction. But on the point of filing the bill, the plaintiff discovered that Humphreys had executed a mortgage of their plant and works, and that a bill of foreclosure had been filed. Humphreys became bankrupt; thereupon the works ceased, and it became useless to continue proceedings. Also, in 1861, a person of the name of Gilespie took proceedings in Scotland, and he obtained the consent of the Lord Advocate to do so; but those proceedings had not been carried on. In addition to that, Gilespie, who seems to have been a considerable opponent of the patent, applied in 1861 to the Attorney-General to commence proceedings in England. The Attorney-General refused his fiat, upon the ground that proceedings had already been commenced in Scotland. Then, the bill stated, that on February 23, 1861, William Jones, of Leeswood, in the county of Flint, applied to the plaintiffs for a licence to use their patent, and he got that licence upon the usual terms. Mr. Jones was the proprietor of a colliery at Leeswood, in Flintshire, where there was found coal very suitable for distillation. The plaintiffs gave Mr. Jones every advantage they could; they allowed a person employed by him to come to their works and inspect them, for the purpose of obtaining a practical knowledge as to the mode of using the invention. Jones then, having got a licence, commenced making oil at Leeswood. He stated that he did not make oil in any great quantities; and he told the plaintiffs that Fernie was about join him in the manufacture as a partner under that licence, which, of course, would have been perfectly legitimate. In the same month of February 1861, the defendant Fernie, had applied to the plaintiffs for a licence; he was offered it upon the usual terms and declined to accept it, because, as he alleged, he thought the terms exorbitant. This appeared to the plaintiffs to render Mr. Jones's statement the more probable, that Fernie was going to join him in partnership under the licence which he had obtained. The Leeswood works were erected to commence operations under Jones; but, in the course of 1861, some other oil-works were erected at a place called Saltney, about 8 miles from Leeswood, with a railway communication between the two places; and the plaintiffs at first thought that the Saltney works were a sort of adjunct to Mr. Jones's works. It was not until the early part of the present year, that the plaintiff had reason to suppose that the defendant Fernie, and not Jones, was the person manufacturing at one or both places. They had great difficulty in ascertaining the fact; but, in February, 1862, the plaintiff being very anxious about the matter, sent a person in their employ, of the name of Rennie, who had charge of their retorts, to obtain information upon the point. Rennie ascertained that nothing was being done at the works at Saltney, and that if any thing was being done at Leeswood, it was on a very small scale. In July, Rennie was sent again, and on that occasion, also, the works at Saltney appeared at a standstill. But, on approaching the works at Leeswood, Rennie saw several horizontal retorts at work with fires burning beneath them; he found that the retorts were charged with coal, and that a process was going on which was substantially the same as that protected by the plaintiffs letters patent. The retorts were being filled with cannel coal, and paraffin oil was being made. Rennie succeeded in obtaining a bottle of the oil so made, and it was found to be precisely similar to that for which the plaintiffs had taken out their patent. The defendant was also proved to have sold a cask of oil of the same character on the 20th of August. The defence seemed to be fourfold. In the first place, there was the usual defence of delay in filing the bill. But the court would remember that, for a considerable portion of 1861, the plaintiffs believed that the works were being carried on by Jones, the licensee. In the next place, the defendant did not deny that he was using coal; nor that he was distilling coal; nor that he was producing an oil identically the same as the plaintiffs; nor that it contained paraffin of the exact character described in the specification; but he said, in doing this he did not go up to what the specification described as a "low red heat." It would be clearly proved that the defendant did so, and that it was impossible very frequently to prevent it. But, whether he did or did not, he was equally an infringer of the patent, because the words of the specification were—"The coals are to be broken into small pieces about the size of a hen's egg, or less, for the purpose of facilitating the operation. The coal is then to be put into a common gas-retort, to which is attached a worm-pipe, passing through a refrigerator, and kept at a temperature of about 55° of Fahrenheit's thermometer bya stream of cold water. The temperature of the refrigerator should not be made too low, lest the product of the distillation should congeal and stop up the pipe; and I find that a temperature of about 55° Fahrenheit is sufficient." Then came the words—"The retort being closed in the usual manner is then to be gradually heated up to a low red heat, at which it is to be kept until volatile products cease to come off. Care must be taken to keep the temperature of the retort from rising above that of a low red heat, so as to prevent, as much as possible, the desired products of the process being converted into permanent gas." Then the concluding words were—"But, in order to obtain the largest quantity of crude paraffin oil from coals by means of this process, and produce the smallest quantity of permanent gas by the action of the heat employed, whatever may be the apparatus used, care must be taken to heat the coals gradually, and to apply the lowest temperature necessary to complete the operation." It amounted to this—You are not to go beyond the low red heat, but go gradually up to it; and if you can get the operation of distillation complete at a temperature lower than the red heat all the better.

The VICE-CHANCELLOR: What is the temperature of a low red heat?

The SOLICITOR-GENERAL: According to the evidence, from 750° to 800° F.

Sir HUGH CAIRNS: Your honour will find it is very different when judged of in the daytime and in the dark.

The VICE-CHANCELLOR: The low red heat of iron one very well understands.

Sir HUGH CAIRNS: What is spoken of here is an iron vessel —a retort; and the evidence shows that a low red heat would be something over 700°; but that is given as a maximum, and, therefore, it is material.

The VICE-CHANCELLOR: A good deal would depend on the quality of the iron.

Sir HUGH CAIRNS: Probably, that would be so. The heat of a retort burning for the purpose of gas manufacture would rise to 2000°.

The VICE-CHANCELLOR: The important words are—"The lowest temperature necessary to complete the operation."

Sir HUGH CAIRNS: The plaintiffs proved that the defendant did go to a low red heat; although his case was that he went to a heat very near it. But it was very curious, as showing the benefits which sometimes arose from affidavits; that in answer to Rennie, who said that on the 20th of August, the Leeswood retorts were charged with cannel coal, because he saw them opened; the defendant said that was utterly impossible, because when the retorts were opened there burst forth a volume of red flame, which made it impossible for any one to see what was inside. The defendant, however, admitted that he did distil from coal.

The VICE-CHANCELLOR: Does your patent cover every kind of coal?

Sir HUGH CAIRNS: Every kind of bituminous coal.

The VICE-CHANCELLOR: And shale?

Sir HUGH CAIRNS: Not shale; the third defence was that the patent was not new; that the process was revealed in books and specifications before Young's patent. All the publications to which the defendant referred, with the exception of four, were before the court in the action against the Clydesdale company; witnesses were examined and cross-examined upon them; and the result was that the jury, under the direction of the Lord Chief Justice General, gave a verdict for the plaintiffs. Therefore, those might be said to he disposed of. As to the other four, with regard to one of them it was not attempted to be proved that it was ever in this country before the letters patent. In addition to that, it would not be found to be a prior publication. As to the other three, they were so puerile as sufficiently to account for their not being put in evidence in the action against the Clydesdale Company. The next defence seemed to be that Mr. Young's specification was not sufficiently definite; which was a point that must, of necessity, have been raised in every investigation into the subject; and, according to the well-known practice of the court, a patent twelve years old, after such investigation, would not be one which the court would disturb upon interlocutory application.

The VICE-CHANCELLOR: Was the defence in the Scotch action, that the heat used was below the "low red heat"?

The SOLICITOR-GENERAL: They were using another material at a red heat.

Sir HUGH CAIRNS: My friend does not mean to say they were not using a bituminous coal.

The SOLICITOR-GENERAL: They were using the "Boghead," a very peculiar mineral.

The VICE-CHANCELLOR: Where is Boghead coal found?

Sir HUGH CAIRNS: In Linlithgow, it is a mineral *sui generis*; but that question does not arise here. Then, as to the evidence, Mr. Young's affidavit verified the bill; Mr. Rennie's stated the circumstances attending his several visits to the defendant's works, and the procuring of the bottle of oil made by the defendant, and the fact that cannel coal was being used in the retorts. Dr. Stenhouse and Dr. Odling stated that they had perused the plaintiffs specification, and that, to the best of their belief, the invention was entirely new at the date thereof; that, previous to the invention, neither paraffin nor paraffin oil had been manufactured from bituminous coal, and that the invention was one of great utility and importance; that they had submitted the bottle of oil procured from the defendants works to careful analysis, and found it to be the same as that which the specification described. The affidavit of the defendant, Fernie, stated that, on his return from America, in September, 1860, he was applied to to make experiments upon certain bituminous shales, which he undertook; during which he found that the Shropshire shales would not give off oleaginous substances when distilled at a low red heat; and that the best products were better distilled at a heat below that. In November, 1860, he met Jones in Scotland, who produced specimens of cannel coal, which, he was informed, were of the same rich, oil-producing character as those which were found in Virginia and New Brunswick. He subsequently distilled such specimens, and found that, from such cannel coal, crude oil, fit for lubricating and illuminating purposes, was obtained to the best advantage at a temperature below any degree or shade of red heat. It was then arranged that he should commence the manufacture of lubricating and illuminating oils.

The VICE-CHANCELLOR: I understand that witness to say that your patent only covers that kind of coal which produces the substance at a low red heat; and that, if he can find another kind of coal which produces it at a lower temperature, he does not infringe.

Sir HUGH CAIRNS: That is not so. Mr. Fernie says he was aware of the widely-extended rights claimed by the plaintiffs; and, although he was advised against the validity of the patent, and believed he was not infringing, yet he was desirous of avoiding litigation and making reasonable terms with the plaintiffs; they demanded a royalty of 4d. per gallon of the crude oil, which Mr. Fernie considered exorbitant, and he declined to pay it.

The VICE-CHANCELLOR: Is acquiescence any part of the defendant's case?

Sir HUGH CAIRNS: It is.

The VICE-CHANCELLOR: Must you go on to contest it to the last? Would it not be a wise thing for Mr. Young to reduce his terms a little?

Sir HUGH CAIRNS: I am told we have been willing to give them a licence at 3d. a gallon; at which price we have licensed others.

The VICE-CHANCELLOR: They are "low red heat" people; the defendant goes below that.

Sir HUGH CAIRNS: I am afraid we cannot reduce our price as he reduces his heat.

The VICE-CHANCELLOR: Does it not resolve itself into this?—the defendant says, that upon the construction of your specification, you have made "low red heat" of the essence of your specification, and the question is, whether that is so? He says he can produce the substance in question at a heat below that. You say the words, "The lowest temperature necessary to complete the operation," enable you to go below red heat.

Sir HUGH CAIRNS: Yes; we claim everything which produces oil by distillation up to a "low red heat?"

The VICE-CHANCELLOR: Is that a good patent which ranges the temperature in such a way that you cannot tell where you are to draw the line?

Sir HUGH CAIRNS: I do not draw the line anywhere till you come to a "low red heat." The defendant said that the minerals distilled at his

works consisted of cannel coal and shale, and some specimens of Boghead coal and American petroleum: but, he denied that he had manufactured paraffin oil by subjecting bituminous coal to a low red heat. He also made it a point that instead of heating the coal gradually in the retorts, his retorts were not charged till they had attained the required temperature. But no man would be allowed to evade a patent in that way; because, if what the defendant stated were true, it could only apply to the first charging. The defendant had referred to Dr. Antisell's work published in America in 1860; and he (Sir Hugh Cairns) would give his Honour the reference to the passage referred to, which was at page 10. [The learned counsel read the passage which stated that although the process of Mr. Young was a decided improvement, and one of great utility, it was not likely, owing to the state of previous knowledge, to startle by its novelty.]

Upon the suggestion of the VICE-CHANCELLOR, it was agreed that the motion should stand over till the hearing of the cause; no injunction to be granted; but the defendant undertaking to keep an account in the meantime.

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## COURT OF QUEEN'S BENCH, WESTMINSTER.

WEDNESDAY, NOVEMBER 12.

(*Sittings in Banco before the Lord Chief Justice* COCKBURN, *Justices* WIGHTMAN, BLACKBURN, and MELLOR.)

### HARGREAVES *v.* TAYLOR.

This case raised a question of very great and general importance under a variety of sanitary Acts, such as the Public Health Act, the Metropolitan Management Act, and the like. It was an appeal by the surveyor of the local board of Health of Taunton, against a decision of justices on an order of the board against the defendant, the respondent, directing him to do certain work on premises of which he is owner, for the purpose of repressing an alleged nuisance.

The order was to make certain brickwork alterations in some necessary places, and also to attach thereto an "efficient water supply," to remove the soil. When the surveyor applied to the justices to enforce the order, the defendant showed he had done the brickwork, and said that he would undertake to throw down from time to time such a quantity of water as would clear the places. The magistrates thereupon found that he "had done all that was necessary, though not all that was ordered," and they dismissed the information. Thereupon the surveyor appealed, and,

Mr. COLERIDGE, Q.C. (with him Mr. FOLKARD), on his part, argued that the justices were not to sit as a court of appeal from the local board, as otherwise dissentient members who voted on the board might, sitting as justices, reverse their decisions.

Justice WIGHTMAN: On the other hand, cannot they consider the mode of compliance? Suppose the thing ordered has in substance been done, but not quite in the mode directed?

Mr. COLERIDGE: Here they have gone much further, and several distinct things having been ordered, they have adjudged one of them to be unnecessary.

Justice WIGHTMAN: Suppose they order something to be done utterly unnecessary and extremely expensive, are the magistrates bound to enforce the order?

Mr. COLERIDGE: Undoubtedly. The surveyor is made the judge of the necessity.

Justice BLACKBURN: Is there no appeal?

Mr. COLERIDGE: None. There is only an appeal from an order of the justices to the quarter sessions, so that if the justices here had made an order there might have been an appeal, but there is no appeal from their refusal of an order, nor is there appeal from the order of the board.

Lord Chief Justice COCKBURN remarked that the board had only authority to order the necessary works. If the works were not necessary they had no power to order them. If the justices deemed them not necessary, had they no discretion but to enforce the order?

Mr. COLERIDGE conceived that they had not.

Justice BLACKBURN observed that the board might honestly, but erroneously, order works very expensive and utterly unnecessary.

Justice WIGHTMAN: And you say that whatever they may choose to order—although utterly unnecessary or ten times more expensive than necessary—still it must be done, and the order must be enforced?

Mr. COLERIDGE: If the case is to be put of the board ordering what is unnecessary, the case may be put, on the other hand, of the magistrates declining to order what is clearly necessary. The Board of Works are composed of gentlemen as respectable as the magistrates, and often are magistrates; and one or two of them who did not concur in a decision, after being outvoted at the board, may reverse the decision sitting as justices.

Lord Chief Justice COCKBURN: On the other hand, the members of the board are often near neighbours of the parties proceeded against.

Mr. COLERIDGE: That no doubt may be so; but there is no more reason to suspect the decision of the board than of the magistrates.

Justice MELLOR: No doubt, to carry out the objects of the Act, it is necessary to repose some discretion in the local board.

Lord Chief Justice COCKBURN observed that necessarily, to some extent, that was so; but in this case, even if the court should uphold the decision of the magistrates, the surveyor might next day give a notice to do the omitted work, and the board might order it to be done.

Mr. COLERIDGE said that clearly was so.

Justice WIGHTMAN: Certainly the thing directed here does not seem, on the face of it, unnecessary.

Mr. COLERIDGE: It is merely to secure a continuous supply of water: without that, the surveyor reports that the places must be a nuisance.

After some further discussion between the learned counsel and the court, no counsel appearing on the part of the defendant,

The COURT said they would take time to consider their decision.

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FRIDAY, Nov. 14.

### YOUNG AND OTHERS *v.* MACRAE.

This was a case of a very curious and novel character, and of very great interest to that large class of persons—advertising traders.

It was an action by a firm of paraffin-oil manufacturers for a libel published by the defendant, in the form of a trade circular, referring to certain paraffin oil imported by another firm from the United States, and sold by the defendant—the circular containing the following report or certificate of Professor Muspratt:—

I hereby certify that I have tested the above oil, and that I find it a colourless and aromatic liquid, while Young's (the plaintiff's) is a reddish brown, and is much thicker and has a more disagreeable odour than it; and, further, that in burning the two oils, comparatively, in the ordinary one shilling lamp, I found the power of light produced by the American oil is equal to four and a half wax candles, whereas Young's, under the same conditions, yields a light equal to nearly one candle (or 25 per cent.) less, which difference is in favour of the American oil.

The plaintiff, in his declaration, alleged that this was published "falsely and maliciously" by the defendant, and that thereby he had sustained certain special damage in the loss of customers for his manufacture.

To this declaration the defendant demurred on the ground that it showed no cause of action.

Mr. MILWARD (with whom was Mr. GATES) argued in support of the demurrer against the right of action. He said the alleged libel merely came to this—that the defendant said, "My oil is better than his." It merely meant that the American oil which he sold was better than the plaintiff's. The defendant had a right to say that, whether it was true or not, if he thought so.

Lord Chief Justice COCKBURN observed, that if the law were otherwise it certainly would put down 99 out of 100 of common trade advertisements. (A laugh.) The libel here certainly is not any reflection on the character of the plaintiff as a trader. It would be otherwise if it had been of this kind, that the plaintiff sold as rhubarb an article half of which was brick-dust. This is a mere comparison between the Americal oil and the plaintiff's, and urging that the former is the best.

Mr. MILWARD: Just so. It is, in short, at the utmost, a mere reflection on the goods, not on the trader.

The COURT then called on

Mr. EDWARD JAMES, Q.C. (with him Mr. T. JONES), for the plaintiffs. This, said the learned counsel, is certainly not the foulest libel I ever heard—(a laugh)—but it is in law a libel, at all events, coupled with special damage in the loss of customers.

Justice BLACKBURN: That will not help you, if it is not in itself defamatory.

Mr. JAMES: It is so, published of a trader.

Justice WIGHTMAN: What does it charge him with?

Mr. JAMES: It is a libel on him as a manufacturer of paraffin oil. It is disparaging of him in that character. The learned counsel cited the case of *Ingram v Lawson*, an action for a letter in the *Times* imputing to a shipowner that he sent out a ship with passengers which was utterly unsafe to his knowledge; but——

Justice BLACKBURN pointed out that this was a serious reflection on the character of the shipowner; but how was it a reflection on the character of a trader to say that he sold goods inferior to others?

Mr. JAMES then cited another case, where, however, it appeared that the court held that the action could not lie, there being no special damage, and the alleged libel being only a reflection on the plaintiff's manufacture. The learned counsel inferred from this that the action would have lain if this had been special damage.

Justice WIGHTMAN, however, thought the case rather against him; and

Lord Chief Justice COCKBURN observed that there was no case in favour of the action.

Mr. JAMES said there was no case against it.

Lord Chief Justice COCKBURN observed that it appeared to him to be a mere comparison between two sorts of oil, and saying that one was inferior to the other.

Justice WIGHTMAN: And not very inferior, because inferior to oil "very superior." The defendant nowhere says that the plaintiff's oil is bad, but only that it is inferior to an oil which he describes as very superior.

Mr. JAMES urged that it was alleged to have been published "falsely and maliciously;" but

Lord Chief Justice COCKBURN observed, that this was alleged generally of the whole, and might apply only to the part which spoke of the American oil.

At the close of the argument for the plaintiff,

Lord Chief Justice COCKBURN, after consulting for a few moments with his colleagues, without calling on the counsel for the defendant to reply, delivered judgment in favour of the defendants. If, he said, one trader published anything falsely and maliciously of an article manufactured or sold by another, even although not conveying any reflection on his personal or mercantile character, and special damage followed, an action possibly might be maintainable, though that need not then be decided. For, although here it was alleged that the defendant published this circular "falsely and maliciously," that might mean merely that the part relating to the American oil was false, and that it was not so good as was represented; not that the fact was false which averred that the plaintiff's oil was inferior in quality. That is, the falsehood might consist in saying that the other oil was colourless, and not in saying that the plaintiff's was not so. The libel, therefore, came merely to a comparison of one oil with another, and the action could not be maintained.

Justice WIGHTMAN concurred, and added that the special damage alleged was that certain persons had bought the American oil: not that they had, in consequence of the libel, declined to buy the plaintiff's.

Justice BLACKBURN and Justice MELLOR also concurred.

Mr. JAMES applied for leave to amend, but this was refused; and

Lord Chief Justice COCKBURN observed: You had better get another professor to give you a report in your favour. (Laughter.)

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### THE MAYOR AND CORPORATION OF BRADFORD *v.* RIPLEY AND ANOTHER.

This was an action by the corporation, as the local board of health, against the defendants, the owners of certain water-works in the town, for an alleged infraction of an agreement with the corporation. Prior to 1857, the defendants had, by means of artesian wells, gained a supply of water, which they had supplied to the premises of the inhabitants, carrying their pipes for that purpose through the land of private persons with their consent, and also through the streets. In 1857, they were indicted by the corporation for a nuisance in taking up the streets for the purposes of their water supply. An agreement had been thereupon entered into by way of a compromise, embodied in the order of a judge, one part of which was that they should not extend their pipes and works to other streets, or make any new communication therewith, or supply to any other premises than those they the supplied. For a breach of this part of the agreement the action was brought. The point was, whether the agreement precluded a new communication or supply not through the streets, the plaintiffs insisting that it did, the defendants urging that it only applied to the breaking up of the streets.

Mr. Cleasby, Q.C., and Mr. West, were for the plaintiffs; Mr. Mellish, Q.C., and Mr. Kemplay, were for the defendants.

The Court were clearly of opinion in favour of the plaintiffs, and gave judgment accordingly.

# Miscellaneous News.

## EQUITABLE GAS COMPANY.

The Half-Yearly Meeting of Proprietors was held on Tuesday, the 4th inst., at the Company's Offices, John Street, Adelphi—J. HOLDSHIP, Esq., in the chair.

The notice convening the present, and the minutes of the proceedings at the last half-yearly meeting were read by the SECRETARY (Mr. Andrews), and the following report and statements of account were presented:—

The statement of accounts which has been forwarded to each shareholder has informed you of the result of the company's operations during the past half year.

In accordance with the intimation to the shareholders at the last meeting, a call of £3 per share has been made on the holders of the new shares, for the purpose of paying the debentures falling due during this year.

The resheeting of the two gasholders referred to in the last report has been completed, and they are now in operation. Another gasholder having, on examination, been found to be in an equally unsound state, it was determined to resheet it at once; and it is expected to be completed for use during this month. Your directors have reason to believe a great saving of gas will be effected by this outlay.

A net profit of £16,116. 13s. 11d. has been realized during the half year, which, with the sum of £121. 17s. 8d. (being the unappropriated profit of the previous half year), makes £16,238. 11s. 7d. available for dividend, from which your directors recommend a dividend of 50s. per share on the old shares, and of 10s. per share on the new shares; and a further dividend of 20s. per share, towards the arrears of dividend on the old shares, for the half year ending June 30, 1856. The said payments to be less the income-tax, which will be deducted accordingly.

*Dr.* *Manufactory and Revenue Account, for the Half Year ending June 30, 1862.* *Cr.*

| | | | | | |
|---|---|---|---|---|---|
| To Tradesmen's accounts, purification, &c. | £ 423 | 9 | 0 | By Gas-rates, to June 30, 1862 | £34,992 6 11 |
| Coals, carbonized | 13,996 | 13 | 1 | Meter-rental | 763 18 4 |
| Wages (manufacture only) | 3,549 | 17 | 5 | Coke, net sales and stock | 4,911 3 4 |
| Rent, rates, and taxes | 363 | 9 | 5 | Breeze, ditto | 209 9 0 |
| Directors fees | 500 | 0 | 0 | Tar, ditto | 922 4 4 |
| Auditors ditto | 60 | 0 | 0 | Ammoniacal liquor | 321 10 6 |
| Salaries | 1,356 | 17 | 8 | | |
| Collector's commission | 575 | 4 | 5 | | |
| Stationery and stamps | 134 | 18 | 10 | | |
| General charges | 177 | 15 | 11 | | |
| Bad debts and allowances | 154 | 15 | 6 | | |
| Wear and tear | 3,624 | 10 | 8 | | |
| Interest on debentures | 815 | 3 | 4 | | |
| General law charges | 36 | 7 | 0 | | |
| Income and property-tax | 34 | 16 | 3 | | |
| Net profit, to June 30, 1862 | 16,116 | 13 | 11 | | |
| | £42,120 | 12 | 5 | | £42,120 12 5 |

*Dr.* *Balance-Sheet.* *Cr.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| To Capital, joint-stock | £240,000 | 0 | 0 | By Investment—amount to Dec. 31, 1861 | £257,162 | 17 | 8 |
| Debentures | 33,900 | 0 | 0 | Less mains taken up | 40 | 17 | 6 |
| Debenture interest | 199 | 1 | 11 | | £257,122 | 0 | 2 |
| Dividends | 574 | 18 | 0 | Charged this half year | 370 | 15 | 0 |
| Tradesmen's accounts, &c. | 2,975 | 1 | 8 | | | | £257,492 15 2 |
| Taxes, rates, &c. | 180 | 18 | 5 | Meters | | | 6,598 14 2 |
| Collector's commission | 280 | 16 | 8 | London and Westminster Bank "deposit" | | | 4,003 4 8 |
| Auditors | 45 | 0 | 0 | Gas-rates | | | 13,631 15 3 |
| Profit and loss | 16,238 | 11 | 7 | Cash balance | | | 4,073 9 8 |
| Income and property-tax | 163 | 8 | 9 | Trademen's accounts for coke, &c. | | | 2,216 6 8 |
| | | | | Coals, stock | | | 4,075 12 3 |
| | | | | Coke, ditto | | | 157 10 0 |
| | | | | Breeze, ditto | | | 45 0 0 |
| | | | | Tar, ditto | | | 21 5 6 |
| | | | | Ammoniacal liquor, ditto | | | 11 16 3 |
| | | | | Service-pipes, ditto | | | 267 13 2 |
| | | | | Main-pipes, &c., ditto | | | 578 1 7 |
| | | | | General stores, ditto | | | 1,384 12 8 |
| | £294,557 | 17 | 0 | | | | £294,557 17 0 |

| | | | |
|---|---|---|---|
| To Unappropriated profits, to Dec. 31, 1861 | £ 121 | 17 | 8 |
| Net profit, to June 30, 1862 | 16,116 | 13 | 11 |
| Amount available for dividend | £16,238 | 11 | 7 |

The CHAIRMAN, in moving the adoption of the report of the directors, said he hoped the facts it recorded would be as gratifying to the shareholders as they were to the board. He was not aware that it was necessary to offer any commentary upon them, and he would only, therefore, say that he believed the consumers and the public generally were satisfied with the way in which the business of the company was conducted.

Mr. KELLY (deputy-chairman) seconded the motion.

Dr. LIDDELL said, it appeared from the accounts which had been forwarded to the company, that the profits of the last half year were not so great as those of the corresponding one of last year.

The CHAIRMAN said, they were in reality more, because the amount available for dividend, in 1861, was increased by an exceptional circumstance—the realization of a sum of above £3000 from the sale of shares.

Dr. LIDDELL inquired what expenditure was incurred upon the gasholders referred to in the report?

The CHAIRMAN said, it was probably about £620 each. The directors were extremely desirous that the works should be put in the best position to answer every requirement of the public service, and, therefore, they were about to re-sheet another gasholder. They felt that the grand point with them was, to reduce the leakage as much as possible, in order to get the utmost benefit from the works.

The motion was then put, and carried unanimously.

Mr. TOD MARDON moved—"That a dividend be now declared, for the half year ending the 30th of June last, of 50s. per share on the old shares, and of 10s. per share on the new shares; and a further dividend of 20s. per share, towards the arrears of dividend on the old shares, for the half year ending the 30th of June, 1856; that the said dividends be paid, less the income-tax, at the termination of this meeting; on the 5th, 6th, and 7th instants; and, afterwards, on Tuesdays and Fridays, between the hours of ten and four."

Dr. LIDDELL seconded the motion, which was agreed to.

Mr. MICHAEL moved a vote of thanks to the directors, for their able management of the affairs of the company. In doing so, he said he felt that it was only necessary to call the attention of the proprietors to the accounts, which showed a profit of 38 per cent. upon the whole receipts, to justify them in passing this resolution with the utmost cordiality.

The CHAIRMAN, in acknowledging the vote, which was heartily responded to, said, the directors fully appreciated the kindness with which the motion had been accepted by the meeting. He could assure the proprietors that the best attention of the board would still be given to the affairs of the company: and, if in their future management they were as successful as they had been in the past, they should be extremely gratified. Their engineer and other officers were working exceedingly well; and he hoped no retrograde movement would take place from the position the company now held.

On the motion of Mr. HADLAND, seconded by Dr. LIDDELL, thanks were voted to the auditors; and the proceedings terminated.

## UNITED GENERAL GAS COMPANY.

A Special Meeting of the Proprietors of this Company was held on Tuesday, the 4th inst., at the Offices of the Company, 6, Austin Friars—ROBERT HUDSON, Esq., in the chair.

The CHAIRMAN, before the formal business of the meeting commenced, said: Gentlemen, perhaps, before the business commences, you will allow me to express my sincere regret that severe illness prevented my attendance at the last meeting. I should certainly have done so, if it had been possible for me to have attended, but I was confined to my bed at the time; and, although I am perfectly aware that there are many gentlemen, both on this side of the table and the other, more conversant with gas matters than myself, I yield to none of them in my desire to promote the best interests and prosperity of a company in which I have been so very long and so very largely interested.

The SECRETARY having read the notice convening the meeting,

The CHAIRMAN said: I believe, now, gentlemen, our first business will be for the solicitor to read the by-law which he has prepared, and which you will be asked to confirm at this meeting.

The SOLICITOR (Mr. Gregory): I will read these by-laws, but I should state that they have been settled with some care by a counsel of eminence, Mr. John Gray. They are as follows:—

That any ballot duly demanded at any general or special meeting of the proprietors of the corporation, on the election of any director or directors, auditor or auditors, or any other affair or business of the corporation, shall be immediately proceeded with, in order to give an opportunity to the proprietors present to give their votes; but such ballot shall not close on the same day, but the meeting shall be adjourned until some future day, not being more than ninety days, and such adjournment shall take place on that day, not later, as a general rule, than the hour of three o'clock in the afternoon; but at any earlier hour or time at which the chairman may require the meeting to be adjourned, provided there shall be no proprietor present who is then prepared to give, and desirous of giving, his vote or votes.

That the adjournment of any meeting for the purpose of taking the ballot shall be sufficient if declared and signed by the chairman alone; and there shall be no voting on the question of such an adjournment, but the chairman's decision thereon shall be final.

That the voting shall be kept open for the space of two days besides or exclusive of the day of the original meeting, and on each of such days the voting shall begin at twelve o'clock, and end at three o'clock in the afternoon; and the adjournments from day to day, at the end of each day, shall be made accordingly.

That when the voting has finally closed, the meeting may be kept open for a further period during the same day sufficient to enable the chairman and the scrutineers—to be appointed as hereinafter provided—to ascertain the state of the voting, and to enable the chairman to declare which way the decision is; or, if the chairman shall deem it proper, he may, at his sole option, adjourn the meeting until a future day, not being more than seven days from the time of such adjournment—the day after the adjournment being counted as the first—and, in that case, the chairman and scrutineers, on the final close of the voting, shall ascertain the result of the same, and the chairman of the meeting shall, at the place of adjournment, publicly and audibly declare such result.

If the chairman shall think fit, he may allow the scrutineers alone to ascertain the state of the voting, and, in declaring the result, act upon their report.

That, previously to any voting, two scrutineers shall be appointed by the proprietors present at any general or special meeting at which a ballot shall be demanded; and, from the commencement of such ballot to the time at which the result thereof shall be declared, the ballot-box or boxes, or vases or vases, to be provided as hereinafter mentioned, shall be in the custody of the scrutineers.

That the proprietor or proprietors voting on the show of hands for the affirmative of the question on which the ballot is to be taken, or the majority in case of difference, shall appoint one scrutineer; and the proprietor or proprietors voting on the show of hands in the negative of such question, or the majority in case of difference, shall appoint the other scrutineer.

That the mode of balloting shall be as follows, that is to say:—A ballot-box or vase, or a sufficient number of ballot-boxes or vases, shall be provided by the directors; and to each proprietor shall be delivered a number of balls, tickets, or

other tokens, to be also provided by the directors, each representing a vote or a particular number of votes, and the whole representing the number of votes the proprietor is entitled to give, including his votes in his own right, as well as votes by virtue of a proxy or proxies, and he shall then, in the presence of the scrutineers, deposit such tickets or tokens in the ballot-box or vase, in the usual way; and such scrutineers shall, immediately after any proprietor shall have voted as aforesaid, check off the votes upon a list of proprietors, or otherwise, and shall, before any vote after the first shall be given, ascertain that there has been no previous voting in respect of the votes then proposed to be given.

Mr. POLLARD: May I ask the advantage of having balls or tickets only, instead of the usual way of the name being taken?

Mr. GREGORY: The name cannot be taken; it is secret voting.

Mr. POLLARD: I think it is always best that everything should be above board, and that it should be done in the same way as is done in almost every other company. In a company that I am connected with, the name of the person is taken; but, according to this by-law, we do not know enough about it. I really do not like anything in the dark.

Mr. GREGORY: The charter prescribes a ballot.

Mr. DOANE: That we call ballot.

Mr. GREGORY: It is not ballot, strictly speaking.

Mr. DOANE: In the Chartered Gas Company, we take the name.

The CHAIRMAN: I think you will find that, at the East India House and the Bank, the motion, or name of the candidate at an election, is written on a paper and put into a glass, but it is not known by whom it is put in.

Mr. DOANE: I have voted by ballot at the Chartered Gas Company, and you put your name in. The secrecy is, that you may not know the individual proprietor or vote, but he knows very well that he writes the name, and he puts it into the glass. That is the way it is done at the Eastern Counties Railway.

The CHAIRMAN: That is how it is here.

Mr. DOANE: No; the paper is always evidence of the name, but the balls are nothing at all.

The CHAIRMAN: We have got the papers printed, and never thought of having balls.

Mr. DOANE: No one hearing the by-laws read over could catch all the points; but I did not hear that there was any provision made that absent proprietors, supposing a ballot is demanded, and the meeting is adjourned, should have the information conveyed to them as to what is going on.

Mr. GREGORY: That would not form part of the by-law. The absent proprietors have notice of the meeting, and of the business to be transacted at the meeting, and they send their proxies to proprietors who are at the meeting, to exercise their franchise for them.

Mr. DOANE: That is not at all what I mean. I do not think that sufficient. I know perfectly well they can do that; but, supposing there is a difference of opinion at this meeting, or at any meeting, and that a ballot is demanded. If there is a ballot demanded, and the chairman has a margin of 90 days within which to name a day on which the ballot is to be taken, of course the absent proprietors should have a circular, in order that they may exercise their franchise, or form some opinion upon the question; and that ought, in my opinion, to be inserted in this by-law.

Mr. GODFREY: I think the charter provides that only the persons should vote who are present, either personally or by proxy.

Mr. POLLARD: Then, what is the use of an adjournment at all, if only those who are present, either personally or by proxy, at the first meeting, can vote?

Mr. DOANE: Does Mr. Godfrey mean to say that, if at the first meeting an adjournment is decided upon, nobody who is not present at that meeting can vote at the adjournment?

Mr. GODFREY: That is a question for the solicitor to answer. My idea would be this: That, if a subsequent meeting is a substantive meeting, the shareholders present at that substantive meeting would be entitled to vote; but, if it is simply an adjournment of a former meeting, my opinion is, that that being simply a continuation of a former meeting, the absent shareholders would not be entitled to vote.

Mr. WARREN: Are not those who may be absent at the first meeting to be made aware of what is going on?

Mr. DOANE: When notice is given that a ballot will take place, there is generally an advertisement in the newspapers that it will be from such a day to such a day.

Mr. WOOD: Is that what the honourable proprietor wishes?

Mr. DOANE: What I wish is, what I find to be the practice in other companies. I am a proprietor in one where there have been serious differences of opinion. Although Mr. Godfrey seemed to say that it is a question for the solicitor to answer, I should apprehend that the construction of this law, if it is put before us for confirmation, rests with us; that is to say, we can confirm it or not. My impression is, that the absent proprietors should be made conversant—I do not care whether by advertisement or circular; but I think the circular is far preferable, because there are a great many people who do not always read advertisements.

Mr. WOOD: In that circular, would you merely give them notice that such a ballot is going to take place, or have it contain everything that takes place at a meeting?

Mr. DOANE: Merely make them acquainted with the question at issue.

The CHAIRMAN: There can be no difficulty in conceding this—that notice be sent to absent proprietors.

Mr. DOANE: The only thing is, that, as we are making a law, I should like to make it perfect. It seems to me an omission, and I think there ought to be a provision made for it.

Mr. POLLARD: There is one other point, and that is, whether proxies must be lodged within any given time before the meeting, or whether they will be used at the meeting?

The CHAIRMAN: I believe there is no provision in the by-law that they should be lodged within any given time prior to the meeting.

Mr. GREGORY: It was thought it would give a greater latitude. There will be two scrutineers appointed at the meeting to assist the chairman. It was considered fair to allow proxies to be handed in at the meeting.

After some further discussion, the last clause of the by-law was amended by retaining the words only "tickets or other tokens."

Mr. GREGORY then read the following addition which he had made to the by-law as proposed:—"That notice shall be given to every proprietor, by a circular sent by post to his or her address, of any adjournment of a meeting at which a ballot shall have been demanded, and of the object of such adjournment."

The CHAIRMAN: Is it your pleasure to confirm the by-law as it has been read by the solicitor, with that addition of sending circulars, and the erasure of the word "balls?"

The resolution for the adoption of the by-law, as amended and added to, passed unanimously.

The CHAIRMAN: Now, gentlemen, the next motion upon my paper is Mr. Christie's; and, before I ask Mr. Christie to put that, I should like to make one or two observations. Mr. Christie, in a circular which he sent out, asked me some questions respecting the working of our company, the wages, the salaries, and the way in which we kept our accounts. I hope Mr. Christie will not think that I was wanting in courtesy in not answering those questions. Although I am perfectly aware, from the statistical returns which we have got, I could have done so with perfect satisfaction to myself, and to the way in which we have carried on the business, I do think that these controversial discussions between proprietors and directors cause great harm wherever they are carried on; and I believe that a good deal of mischief is being done by these controversial discussions now in Dublin, where it is important for us to be as quiet as we can: for, in a very short time, we must recollect that we have to come to a fresh arrangement with the corporation. Gentlemen, we have no objection at all to go to the ballot: we are prepared for it; but, at the same time, seeing that a good number of our influential proprietors think that some inquiry is necessary, we wish to meet you in a spirit of conciliation; and we should be very happy, indeed, to meet any committee of the proprietors; to go with them into the investigation of these accounts, and to render them all the assistance in our power. I think I need not go further than that. I am sure that Mr. Christie intends nothing hostile towards the directors; and I hope that nothing I have said will be considered as other than conciliatory towards the proprietors.

Mr. CHRISTIE: I need not tell you that I am very much pleased with what the chairman has said. I can assure the whole body of the proprietors, that knowing several members of the board, and having had some few interviews with the chairman lately, I could not do otherwise than have the highest respect for those gentlemen. All that I ever wished was to give them some practical assistance, which I really conscientiously believed would result in great advantage to this company. I was prepared to-day to go into statements, but it would be merely reiterating what I have stated before, and there is no doubt that it is possible the chairman might explain away some portion of those statements; I should be exceedingly glad to have had that explanation; but, that he can explain away all, I feel sure he cannot. I am confident that this company has not been worked as well as it might have been, and I think from the liberal spirit which the chairman has now evinced, that to have some practical assistance will result in good to this company. I cannot sit down without saying to the chairman that I am equally prepared to go to the ballot, and I assure you, gentlemen, I have some of the largest shareholders in this company with me. I am supported very largely indeed. We do not mean faction in any way whatever, but we mean in a business-like spirit to examine our affairs. However, it is of no use occupying the time of the meeting. The fact is the chairman concedes the committee, and, therefore, it is useless to detain you any longer. I will just formally propose the resolution, and not go at all into details.

The CHAIRMAN: It would require a rejoinder on our part which is perhaps better avoided.

Mr. CHRISTIE: I quite agree that it might raise some feeling which is better avoided, because in the heat of discussion we do sometimes use words which are better not made use of. Therefore, I will propose—"That a Committee of Consultation be appointed to ascertain whether any, and if any, what steps can be taken to improve the working of the company; such committee to consist of four directors nominated by the board, and four shareholders, viz., Messrs. Warren, Garraway, Stephenson and Christie, with power to call for all books and information, and to report at the next half-yearly meeting."

Mr. STEPHENSON: I am very happy to second that motion.

The resolution was then put, and carried unanimously.

The CHAIRMAN: Allow me to say, Mr. Christie, that perhaps it will be convenient for you to appoint a meeting of the committee as soon as possible. We have summoned both our agent, Mr. Sanders, and our engineer, Mr. Romans, over from Ireland, and you, as connected with gas-works, must be very well aware that it is very inconvenient for our engineer to be absent from the works at Dublin at so important a time of the year as this is. As there are many questions with respect to carbonization and fuel, and other things, which only the engineer or agent could answer satisfactorily, we have wished that you should have the advantage of their presence.

Mr. CHRISTIE: When I proposed this motion, I, and likewise the friends who joined me, made up our minds to give a little time to the company's affairs, and we are quite prepared even to-morrow to go into the matter with your engineer. I quite agree with you that it is important to proceed at once. We will do everything in our power to meet your views.

Mr. WOOD: That can be arranged after the meeting.

The CHAIRMAN: I was just going to say that it would be better to meet and arrange that after the business of this meeting is closed.

Mr. GODFREY: I am authorized by Mr. Henry Wilkin, who is not desirou of dividing the meeting, to withdraw his name as a candidate for the auditorship. I would congratulate the shareholders upon the determination which the directors have arrived at to-day in conceding the motion of Mr. Christie. I think, if I may take the liberty of saying so, that they have adopted a wise and a proper course. At the last meeting, I was not aware that the gentlemen who brought forward the resolution represented so large a section of the shareholders. Since then, I have learned that they do represent a very large and influential body—large in number, and influential in respect of the holding they possess of the stock of the company. Under those circumstances, I think it would have been exceedingly unwise on the part of the directors to have resisted the motion; inasmuch as, if they had a majority, I do not think that majority would have any right to dominate over a large minority.

Mr. STEPHENSON: I will propose Mr. Garraway. I need say nothing as regards Mr. Garraway's capabilities, because they were fully put before you at the last meeting. I, therefore, merely move—"That he be elected an auditor of the company."

Mr. WARREN: I shall have great pleasure in seconding that.

The resolution was then put and carried *nem. dis.*

Mr. GARRAWAY, in acknowledging the vote, said: Gentlemen I have to thank you for this mark of confidence reposed in me. I have also to thank the directors as one of the Committee of Consultation, for the kind manner in which they have conceded this point; and, I say emphatically, that from this day will commence a new era in the progress of this company. I can assure you that my best talents and energies shall be brought to bear on the accounts of the company.

Mr. CHRISTIE: Before we separate, I beg to move that we unanimously agree to a vote of thanks to our chairman.

Sir C. D. CROSLEY: I have very great pleasure in seconding that. At the last meeting, I had the honour to address the proprietors, and I then mentioned the high integrity and honour of your directors. I think we have had a proof of that to-day. I think no body of gentlemen could have acted

more handsomely and honourably than the directors have done in acceding to the wishes of a large number of the proprietors. I can only say, as a fact, that this movement instead of doing injury to your property is doing a large amount of good, by increasing the value of your shares; and I believe it is doing good in Ireland, also.

The resolution passed *nem. con.*

The CHAIRMAN said: I beg leave to thank you, gentlemen, most sincerely on my own part; and I must include my brother directors; for they co-operate with me in everything. We are anxious to do our duty, and only want your support to carry this concern on to still greater prosperity.

## CHARTERED GAS COMPANY.

The Half-Yearly General Court of Proprietors was held at the Company's works, Horseferry Road, Westminster, on Friday the 7th inst.—SIMON ADAMS BECK, Esq., the Governor, in the chair.

The SECRETARY (Mr. J. O. Phillips) read the advertisement convening the meeting, and the minutes of the last general and special courts of proprietors.

The following report and statements of account* were taken as read:—

The directors congratulate the proprietors on the fact of the working of the company for the half year ending Midsummer 1862, having proceeded with such uniform smoothness and success, as to have left them but little to record, beyond the continuance of the improvement alluded to in their last report.

Notwithstanding a diminished consumption of coal, there has again been an increase of rental for light, as compared with the corresponding period of last year; and, although a recently-concluded purchase of extensive premises, immediately adjoining the Westminster station, will enable the company to increase, considerably, the manufacturing capabilities of that station, still the demand for gas-light is so generally extending throughout the company's entire district, that there is little doubt of the necessity for an even greater extension of works, more particularly as regards gasholders, in the neighbourhood of all the stations, at no distant period, the effect of which will, it is confidently anticipated, be to produce a further increase of rental and a commensurate addition to profits. For immediate requirements, however, the several stations, and the plant in connexion with them, are in a high state of efficiency.

The rental derivable from the sale of coke falls, the directors regret to say, considerably short of that shown in the account for the half year ending Midsummer 1861; the diminution in the receipts from that product being, in some degree, attributable to the diminished consumption of coal before adverted to, but in a larger measure, to the low price which coke has of late commanded, in consequence, it is presumed, of the increasing supply to the metropolis, by railway, of cheap inland coal.

The directors continue to take a deep interest in all inventions calculated to improve, or promote economy in, the manufacture of gas, as well as the utilization of its residual products, and they omit no opportunity of practically testing such as hold out a fair prospect of success.

The financial position of the company is exhibited in the annexed account, which has been thoroughly investigated by the auditors; and it is with great satisfaction that the directors announce, that the net profits realized during the half year are sufficient to enable them to declare a dividend at the sate of £9 per cent. per annum (free of income-tax), which will be payable by warrants, transmitted, as usual, by post, to the shareholders, on the 15th day of November next.

The GOVERNOR: Gentlemen, having received the report and taken it as read, I will now move, if you please, that it be adopted in the usual manner. Before any gentleman offers an observation upon it, I will bring before you my usual half-yearly statement, and then you will be in possession of every particular relating to the company. I find in the present half year, as compared with the corresponding half of 1861, that we have this year used 65,000 tons of coal as against 68,900 tons in 1861. The total expenditure for coals during the last half year, has been £60,138 against £70,082 for the corresponding period of 1861, being a difference of nearly 2s. per ton. The decrease of coals in quantity during the last half year has been 5½ per cent., and in cost per ton, 9½ per cent. The gas made in 1861 was 622,000,000 cubic feet, and in 1862 it was 623,000,000 cubic feet, which is an increase of 1,000,000 feet, with 4000 tons less of coal, which I think is very satisfactory indeed. The gas per ton of coals was 9028 cubic feet in 1861, and during the last half year it was 9557 cubic feet, which is also very gratifying. The rental of light in 1861 was £110,668, and last half year it was £116,371 which is an increase of 5 per cent. upon the rental. The products in 1861 were £24,844; in the last half year they were only £20,311, being a decrease of 18½ per cent., arising entirely from the diminution in the receipts for coke, for which there has been very little demand. Whether that arose from the low price of coal generally, or from the quantity of inland coal brought up to London by rail, I do not know, but we have certainly not been able to realize the same price for coke that we have formerly done, and I believe the complaint is universal. The rental per ton of coals in 1861, was 32s. 1½d., and, during the last half year, 35s. 8½d., being an increase of rental per ton of 11¼ per cent. The net cost of coal in 1861, deducting products, was 13s. 1½d. per ton, and, during the last half year, 12s. 2½d., being a decrease in cost of 7 per cent. Retorts, per ton of coals in 1861, were 6½d., and during the last half year, 11⅜d. This arises from the circumstance that we have had to increase our retorts, and many of them were worn out. This item, therefore, is against us on this occasion. General wear and tear in 1861 was 2s. 5½d. per ton; during the last half year it was 1s. 11½d., being a decrease of 20 per cent., which is very satisfactory. Wages and contingencies in 1861 were 4s. 0¾d. per ton, and during the last half year, 4s. 1¾d. The rental realized per 1000 feet of gas, at Midsummer 1861, was 3s. 7¾d., and during the last half year it was 3s. 8⅜d. Coke for sale in 1861 was 55⅜ per cent.; during the last half year, 57½ per cent. So that with one exception everything is very gratifying and most favourable to the company.

The Hon. R. H. BROWNE (deputy-governor) seconded the motion.

Mr. BROWN: Can you give us the amount of fuel per ton? It is evidently favourable.

The GOVERNOR: You can hardly judge in this company, because of the quantity of Boghead coal we use. The Boghead yields no coke for use, and we are obliged to employ the fuel of the Newcastle coal in producing our cannel gas. The figures, therefore, would give you no information if I could supply them, but the account is not kept separate.

Mr. BROWN: However, it is very favourable.

Mr. BOX: I am very much pleased to find that the governor has gone into statistics, and am further gratified to be able to say, from the cursory view I have taken of the accounts in the short time at my disposal, that those statistics are perfectly accurate.

The GOVERNOR: In answer to the question put by Mr. Brown, I may say that the fuel is about 28 per cent.

Mr. BOX: As to the excess of rental over the corresponding period of last year, it is £5903. Now, how that has taken place I dare say may be accounted for; I think there must be a considerable decrease in the unaccounted-for gas, or you have had a much better coal than you formerly used—one or both causes together. I am sure that the accounts show that there has been a considerable degree of attention paid by the board, and by the officers under the board, to our affairs, and they deserve our best thanks for bringing our affairs to their present happy position. I am glad to find that my cursory examination of the accounts shows results which so nearly agree with the statements that have been made to us.

The GOVERNOR: I assure you it gives me great pleasure to have your approbation.

Mr. GRAY: I am quite sure it must be gratifying to the directors, and the meeting generally, to have ascertained from my worthy friend, Mr. Box, that he has nothing to complain of.

Mr. BOX: I do not know of anything.

Mr. GRAY: That amounts to the same thing: because, I am quite sure, if you did, you would mention it. Our friend is always very anxious to throw light upon every subject; and I sometimes fancy that he goes too minutely into details, the publication of which does not operate to the advantage of the companies. I think we have disclosed a great deal too much of our affairs sometimes; and any supposed discrepancies on our parts always furnish our opponents with weapons to use against us. We had an opportunity of seeing the result of this kind of thing, in the Committee of the House of Commons, on the Metropolis Gas Bill. I believe that all the information which our opponents got was from statements made at the meetings of gas companies; and I mention it to show my friend that while seeking to elicit facts for his own satisfaction, he should be careful not to furnish weapons to our adversaries. We have been deprived to-day of a long speech from my worthy friend; but I do not much regret it, remembering that brevity is the soul of wit. The accounts laid before us are, I think, most gratifying; and I quite agree in the observation just made, that the thanks of the proprietors are specially due to the directors, and those who are the operatives connected with the works, for the care and attention they have bestowed on our affairs. I think we may fully anticipate that, if the same zeal and energy continue to be manifested by the directors—of which I have no doubt, we shall have the same gratifying results laid before us on another occasion.

The motion was then put and carried.

Mr. SHOVE: The governor has stated that there has been a diminished sale for coke during the half year. Now in the only other gas-works with which I am acquainted—the Phœnix at Greenwich—there has never been so brisk a demand as during the same period, and they have never had any accumulation. May I ask whether you sell coke by the measured chaldron, or are the sacks filled promiscuously?

The GOVERNOR: We do not measure every bushel, as it would create too great a delay. We have an honest set of men about us, and do everything to prevent error. A man who is accustomed to filling sacks can tell at once whether those which are offered to him to be filled will hold more than three bushels. It would create a great deal of delay to measure each, and we do not think it would pay.

Mr. GRAY: It would drive all your trade away.

Mr. BROWN: I think it is quite right to direct attention to this subject. We all know—at least those engaged in the coal and coke business for they are twin brothers—that it is a very black trade, and requires a great deal of supervision. At the same time, I am aware that you cannot go into the minute measurement which the honourable proprietor suggests. As regards the increase of the Phœnix, that is true; because our friends there have to congratulate themselves upon making a much greater quantity of coke, and, if they had not a very ready sale, they would soon have a huge mountain accumulate. I should like to ask one question. I see in the balance-sheet there is an item which I am very glad to find in it—"New coal-store"—but I also observe that, at the time the accounts were made up, you had about £3000 less of coals in stock than at the same period last year.

The GOVERNOR: We consider that as a most fortunate circumstance. We have sometimes had a large stock at Midsummer, instead of being empty.

Mr. BROWN: Then, I presume, you are now storing considerably more?

The GOVERNOR: We are.

Mr. BROWN: On a former occasion, an honourable proprietor denominated me "the stormy petrel" for the remarks I felt bound to make. I then took as my theme coals, and dwelt upon the importance of the Coal Committee looking, first of all, to see into the character of the coal employed, and then to inquire whether the system of purchasing at the pit's mouth or in the pool would make a difference in the return of gas per ton, as in attention to that item alone I considered in the course of two or three years we should find ourselves in the position we now have to congratulate ourselves upon. I am gratified at the steps the directors have taken in reference to the coal-store, and I predict that our affairs will still go on improving, because I see that there is considerable attention paid to that matter. In taking your accounts at that time, I recollect the return of gas per ton was about 9000 cubic feet. I took the liberty of calculating that you would be able to improve upon that and obtain 9300 feet, and you smiled somewhat incredulously, though with your usual courtesy, at the suggestion of our arriving at that amount.

The GOVERNOR: No; I think not.

Mr. BROWN: I noted that you not only checked me in my statement by your smile, but by your declaration, that I had made a calculation of 9300 feet, which was an amount we should never arrive at.

The GOVERNOR: You must be mistaken. I never had the slightest doubt of 9300 feet. I heard some person calculate 10,000 feet, and I did doubt that, but I never had the slightest doubt that we could make 9500.

Mr. BROWN: However that may be, sir, I do congratulate you that you have arrived at an amount which certainly at that time, in your most sanguine expectations, you did not look forward to so soon. You have produced 9527 cubic feet per ton, which will account for a large increase in the profits. It was for that reason I directed my remarks to the subject of coal, persuaded that so long as you were buying coal in the pool, which you were then obliged to do for want of storeage accommodation, you would never be able to realize the satisfactory yield per ton that you now are securing. At the last meeting, I asked you whether or not you were using Washington coal, and whether you could give us an account of it? My reason for asking was this—it has been my lot, for the last twenty years, to be every week superintending the purchase of thousands of tons of coal, and this has led me to watch the effect of purchasing at the pit's mouth. At that very period, I asked you about the Washington coal; it unfortunately came under my observation by the using of that coal that we were losing 350 feet per ton. Only a few months ago, I had to buy a cargo of Washington coal to send out to India. After it was shipped, I found that the vigilance of your board and officers had refused that cargo because it was so bad, which for want of vigilance it fell to my lot to have. My report of it is, that the yield is only 8700 feet of gas per ton, and I mention it as showing, that a great deal of attention is being paid by our directors to the purchase of coal. I do not despair of your advancing in this matter, and I

* For accounts, see next page.

*Dr.* *Profit and Loss Account, from December 25, 1861, to June 24, 1862.* *Cr.*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| To Coals consumed in the half year, including labour | | | | | £60,138 | 1 | 7 | By Rental of light for the half year | £116,371 | 13 | 3 |
| Stores, &c., used in the half year, viz.:— | | | | | | | | Coke and breeze for the half year, viz.:— | | | |
| Retorts and setting, including labour | | | | | 3,205 | 15 | 0 | Coke | £15,637 9 1 | | |
| Lamps and lamp lighting, ditto | | | | | 2,184 | 2 | 9 | Breeze | 783 8 2 | | |
| General wear and tear, and mains | £7,016 | 12 | 0 | | | | | | 16,420 | 17 | 3 |
| Less received for old and burnt stores | 656 | 9 | 2 | | | | | Tar and other products for the half year | 3,890 | 4 | 2 |
| | | | | | 6,360 | 2 | 10 | Discounts and abatements allowed by tradesmen for cash payments | 1,411 | 4 | 10 |
| Carrying on the works | | | | | 3,214 | 17 | 6 | Poplar station rent account, balance | 12 | 5 | 7 |
| Meters and fixing, including labour | | | | | 3,388 | 11 | 8 | Rents received | 321 | 2 | 11 |
| Paving | | | | | 742 | 5 | 10 | Interest received on deposits at bankers | 22 | 5 | 11 |
| Directors and auditors | | | | | 1,229 | 11 | 0 | Sale of 3 new shares, forfeited for non-payment of call | 73 | 2 | 6 |
| Salaries and commissions | | | | | 5,479 | 9 | 2 | | | | |
| Wages and contingencies, viz.:— | | | | | | | | | | | |
| Wages | £12,521 | 2 | 8 | | | | | | | | |
| Contingencies | 850 | 11 | 7 | | | | | | | | |
| | | | | | 13,371 | 14 | 3 | | | | |
| Rent and taxes, viz.:— | | | | | | | | | | | |
| Rent | £475 | 4 | 0 | | | | | | | | |
| Taxes | 2,002 | 18 | 4 | | | | | | | | |
| | | | | | 2,478 | 3 | 1 | | | | |
| Income-tax | | | | | 1,497 | 5 | 3 | | | | |
| Law expenses | | | | | 717 | 8 | 5 | | | | |
| Annuity to Mr. J. Cowell, late accountant | | | | | 65 | 0 | 0 | | | | |
| Sick and benevolent fund | | | | | 130 | 0 | 0 | | | | |
| Debts due at the stations, being bad, written off | £1,274 | 17 | 10 | | | | | | | | |
| Received on bad debts | 61 | 4 | 7 | | | | | | | | |
| | | | | | 1,213 | 13 | 3 | | | | |
| Depreciation of gasholder and coal-store on leasehold property | | | | | 60 | 0 | 0 | | | | |
| | | | | | £105,476 | 1 | 7 | | | | |
| Balance | | | | | 33,046 | 14 | 10 | | | | |
| | | | | | £138,522 | 16 | 5 | | £138,522 | 16 | 5 |

*Dr.* *Balance-Sheet, June 24, 1862.* *Cr.*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| To 1st, 2nd, and 3rd capitals | | | | | £600,000 | 0 | 0 | By Amount due to the company, viz.:— | | | |
| Fourth capital at Christmas | £119,460 | 0 | 0 | | | | | For rent of light at the several stations, viz.:— | | | |
| Amount received this half year on account of further call upon 4th capital | 540 | 0 | 0 | | | | | Westminster station | £36,776 | 10 | 6 |
| | | | | | 120,000 | 0 | 0 | Brick Lane ditto | 16,218 | 4 | 5 |
| Expended, viz.:— | | | | | | | | Curtain Road ditto | 7,486 | 12 | 11 |
| Westminster station— | | | | | £720,000 | 0 | 0 | | | | £60,481 7 10 |
| Balance at Christmas | £390,683 | 9 | 1 | | | | | For coke and breeze sold at the stations, viz.:— | | | |
| Expended this half year, viz.:— | | | | | | | | Westminster station | £1,012 | 3 | 11 |
| For Purchase of freehold and leasehold property | £293 | 17 | 10 | | | | | Brick Lane ditto | 981 | 14 | 7 |
| Balance of mains, meters, &c., paid | | | | | | | | Curtain Road ditto | 220 | 1 | 0 |
| Western Gas Co. | 216 | 10 | 7 | | | | | | | | 2,213 19 6 |
| New coal-store | 742 | 6 | 5 | | | | | For tar and other products sold at the stations | | | 199 1 3 |
| Ditto mains | 295 | 2 | 4 | | | | | Balances of sundry accounts due to the company | | | 1,716 10 5 |
| | | | | 1,548 | 17 | 2 | | Treasurer's accounts, viz.:— | | | |
| Brick Lane station— | | | | | £392,232 | 6 | 3 | Balance of general account | £11,050 | 12 | 1 |
| Balance at Christmas | £166,830 | 4 | 7 | | | | | Ditto of dividend ditto | 622 | 0 | 9 |
| Expended this half year, viz.:— | | | | | | | | | | | 11,672 12 10 |
| For Purchase of freehold and leasehold property | £9 | 9 | 0 | | | | | Cash advanced to pay wages at the stations | | | 980 0 0 |
| New offices | 28 | 1 | 6 | | | | | Stores on hand, viz.:— | | | |
| Ditto coal-store | 1,688 | 11 | 0 | | | | | Westminster station | £3,183 | 14 | 11 |
| Ditto exhauster | 27 | 9 | 0 | | | | | Brick Lane ditto | 2,111 | 18 | 10 |
| Ditto lamp governors | 177 | 0 | 0 | | | | | | | | 5,295 13 9 |
| Ditto sulphate apparatus | 110 | 5 | 6 | | | | | Coals on hand, viz.:— | | | |
| Ditto mains | 123 | 10 | 9 | | | | | Westminster station | £10,296 | 9 | 3 |
| | | | | 2,164 | 6 | 9 | | Brick Lane ditto | 4,476 | 7 | 7 |
| Curtain Road station— | | | | | 168,994 | 11 | 4 | Curtain Road ditto | 358 | 1 | 8 |
| Balance at Christmas | £84,652 | 8 | 1 | | | | | On shipboard | 862 | 8 | 9 |
| Expended this half year, viz.:— | | | | | | | | | | | 15,993 7 3 |
| For New tank and gasholder | £398 | 8 | 10 | | | | | Coke and breeze on hand, viz.:— | | | |
| Ditto photometer | 50 | 3 | 7 | | | | | Westminster station | £104 | 6 | 9 |
| Ditto lamp governors | 60 | 0 | 0 | | | | | Brick Lane ditto | 7 | 19 | 8 |
| Ditto mains | 206 | 8 | 5 | | | | | Curtain Road ditto | 4 | 5 | 8 |
| Purchase of freehold and leasehold property | 19 | 13 | 6 | | | | | | | | 116 12 1 |
| | £734 | 14 | 4 | | | | | Tar and other products on hand | | | 287 14 11 |
| Less deposit on purchase of freehold from Stevens, refunded | £100 | | | | | | | Ship *Dispatch* | | | 608 8 7 |
| Less amount received for dilapidations, Cumberland Street Chapel | 50 | | | | | | | Depreciation-fund, for gasholder and coal-store on leasehold property, invested in the purchase of £223. 8s. 7d. Reduced Three per Cent. Annuities | | | 205 13 8 |
| | 150 | 0 | 0 | | | | | Contingent-fund, invested in the purchase of £19,523. 14s. 3d. Reduced Three per Cent. Annuities | | | 18,399 3 5 |
| | | | | 584 | 14 | 4 | | Overend, Gurney, and Co. | | | 10,000 0 0 |
| | | | | | 85,237 | 2 | 5 | G. C. Glyn | | | 12,000 0 0 |
| | | | | | 646,464 | 0 | 0 | | | | |
| | | | | | £73,536 | 0 | 0 | | | | |
| Dividends remaining unpaid | | | | | 5,678 | 16 | 8 | | | | |
| Debts due by the company for coals, and to tradesmen and others | | | | | 7,484 | 10 | 1 | | | | |
| Amount due to collectors for commission, viz.:— | | | | | | | | | | | |
| Westminster station | £579 | 2 | 2 | | | | | | | | |
| Brick Lane ditto | 253 | 1 | 5 | | | | | | | | |
| Curtain Road ditto | 132 | 0 | 1 | | | | | | | | |
| | | | | | 964 | 3 | 8 | | | | |
| Amount due for wages and contingencies, viz.:— | | | | | | | | | | | |
| Westminster station | £321 | 16 | 1 | | | | | | | | |
| Brick Lane ditto | 214 | 0 | 7 | | | | | | | | |
| Curtain Road ditto | 44 | 11 | 4 | | | | | | | | |
| | | | | | 580 | 8 | 0 | | | | |
| Amount due at chief office for contingencies | | | | | 17 | 2 | 7 | | | | |
| Balance of profit and loss, viz.:— | | | | | | | | | | | |
| Balance to Dec. 25, 1861 | £29,530 | 13 | 3 | | | | | | | | |
| Less half year's dividend on £719,460 | 29,117 | 11 | 11 | | | | | | | | |
| | | | | £413 | 1 | 4 | | | | | |
| Profit of the half year ending June 24, 1862 | | | | 33,046 | 14 | 10 | | | | | |
| | | | | | 33,459 | 16 | 2 | | | | |
| Contingent-fund, at Christmas, 1861 | | | | £18,121 | 13 | 2 | | | | | |
| Add dividend received on amount invested | £277 | 10 | 3 | | | | | | | | |
| Less loss on coals at sea | 265 | 8 | 9 | | | | | | | | |
| | | | | 12 | 1 | 6 | | | | | |
| | | | | | 18,133 | 14 | 8 | | | | |
| Depreciation-fund, for gasholder and coal-store on leasehold property, at Christmas, 1861 | | | | £255 | 13 | 8 | | | | | |
| Add proportion for this half year | | | | 60 | 0 | 0 | | | | | |
| | | | | | 315 | 13 | 8 | | | | |
| | | | | | £140,170 | 5 | 6 | | £140,170 | 5 | 6 |

believe we shall some day see the return up to 9800 feet per ton. We shall then be at our maximum of 10 per cent., and so I told you at the period when you were paying only 6½ per cent.

The GOVERNOR: Occasionally, we have got 10,000 feet per ton. Coal may be very good, but, from getting wet on board ship or in the trucks may be very much deteriorated, and this may happen, of course, although we have the best storeage in the world. We cannot help the coal getting wet in the barges, and that may knock it down to 500 feet per ton.

Mr. BROWN: I see you are very rich at the bankers. I have no doubt you are good financiers enough not to allow the money to lie idle.

The GOVERNOR: It is on deposit at interest, though that of course is very small.

Mr. BROWN: I congratulate you on the state of the working account, and I quite agree with Mr. Gray that there must have been great attention paid to it by the directors, and by their officers.

Mr. BOX: There is one thing I forgot to mention, and that is the expenditure upon revenue—not the amount, but the per centage. It is just above 8½ per cent. less than it was. I quite fall in with the remarks of the last speaker that 9800 feet of gas per ton of coal is what we may reasonably expect. It has been done in several companies of the metropolis, and in the provinces.

The GOVERNOR: Not 13-candle gas. You must recollect when you speak of the yield of gas per ton, what is the quality of the gas we have to supply.

Mr. BOX: I take the Phœnix; they have done more than that, and their gas is giving general satisfaction.

The GOVERNOR: London gas must be up to a certain standard.

Mr. BROWN: It is the same everywhere else.

The GOVERNOR: Not in country towns. The London companies are under a very high standard.

Mr. BOX: What with the increased quantity of gas obtained per ton, and the reduction of expenditure upon revenue, I shall expect at no distant period of time, if my life is spared, that we shall not only have 10 per cent, but something on account of back dividends.

The GOVERNOR: I hope so, and expect it, too.

The SECRETARY read the following report from the court of directors:—"Directors minutes, October 24. Resolved: That a dividend, at the rate of £9 per centum per annum, free of income-tax, for the half year ending 30th of June last, be now declared and reported to the general court of proprietors, to be held on Friday, the 7th of November next."

The GOVERNOR: There is one fact worth mentioning—we have paid 9 per cent. before on one occasion, but this 9 per cent. is on an increased capital of £60,000, so that it is far more favourable. The former 9 per cent. also was partly made up by premiums on shares; this is entirely derived from the profits of working, so that it is most satisfactory in every way.

On the motion of the GOVERNOR, the following resolution was then adopted—"That the dividend declared by the court of directors be approved and adopted, and be payable, by warrant on the treasurers, on and after the 15th day of November instant."

The GOVERNOR: There is a report upon the increase of the salaries of the officers, which, I hope, you will approve. We have reason to be satisfied every way with the conduct of our officers, and we have entered into a systematic arrangement, by which the persons in our service are to commence their duties at a certain scale of remuneration, and go on gradually increasing year by year, till they reach the maximum salary attached to their respective offices. We think that that is the most satisfactory arrangement, as a man then knows what he is about, and he is encouraged by the thought that, the longer he remains in the service of the company, the better it will be for him. Of course, we reserve the power, under special circumstances, to exercise our discretion as to giving an officer an extra amount, or of removing him to another class.

The SECRETARY read the report referred to by the governor, which related to the salaries of the secretary, the superintendent, and deputy, at the Westminster, and the superintendent of the eastern-district stations. The directors proposed that the salary of the secretary should be increased £100 per annum, until it reaches £1000; that the salary of the superintendent at the Westminster station be raised to £700; that of the superintendent of the eastern stations to £525; and that of the deputy-superintendent at Westminster (Mr. Bannister) to £300 per annum. The report stated that, at Midsummer last, the directors dispensed with the services of Mr. Dalton, who, for forty-five years, had been an upright and devoted officer of the company. His salary was £300 per annum; and, in consideration of his services and advanced age, the directors had accorded him a retiring allowance of £200 per annum, the confirmation of which the meeting was now asked to give.

Mr. BOX asked what were the present salaries of the officers referred to in the report?

The SECRETARY said his own salary was £600; Mr. Evans's, the superintendent at Westminster, was £600; Mr. Upward's, of the eastern stations, £440; and Mr. Bannister's, £225.

The GOVERNOR: In bringing this report before you, and asking you to confirm it, I can assure you that it was adopted by the directors after a great deal of careful consideration. We had several meetings upon it, and we are all so satisfied with the diligence and energy of our officers, that we felt not the slightest hesitation in advising you to the course we have here recommended. With regard to the secretary, you will probably say these are rather early days to give him an increase. We thought, when we elected him, that we could not give him more than we gave our former secretary, who had been so many years in the service of the company; but, at the same time, we felt that if we had got a gentleman who was capable and well qualified to perform the duties of his office—and looking, too, at what other companies are doing—£600 a year was, after all, but a small salary. Because, as you must be well aware, a secretary's attention or inattention will make many hundreds a year difference to a company. After a few months knowledge and experience of Mr. Phillips's ability and energy, I have no hesitation in saying he is the right man in the right place. His diligence is beyond anything I have hitherto seen; he enters into his work with his whole heart and soul, and is prepared at all points when we come here at the board meeting; so that we think that even £1000 a year—if he lives to attain that salary—will not be one penny too much for his services. I find the Imperial Company have elected a secretary, since Mr. Phillips's election, to whom they give £1500 a year at starting; and they are of opinion that a hundred or two, if you get the right man, is, after all, but a small matter. With respect to all the other officers, I can only say that their diligence and ability fully entitle them to the recognition which the report proposes. We have been very chary—I think, too much so—about increasing the salaries of our officers: for, I believe, if you want a man to be hearty in his work, you must let him feel that he has some personal interest at stake in it.

Mr. GRAY: Having had some experience in matters of this sort, I entirely concur in the recommendation of the directors. I am sure that the true policy is to reward your officers in proportion to their merits. I think, we are consulting our own interest in giving them all an adequate remuneration for their labour. There is nothing so bad as a false economy. With regard to the superannuation of Mr. Dalton, I consider that in this also the directors have exercised a sound discretion.

The GOVERNOR: I did not mention Mr. Dalton; but you will, perhaps, allow me to say that a better officer than he was I think I never saw in my life. He did his duty; and saw that all who came in contact with him in his department did theirs. I believe that he was integrity itself.

Mr. BOX: I think we are moving too fast in this matter. I have no objection to the report and recommendations of the directors being read to this meeting, but I think they should have taken into consideration what was due to the proprietors first of all. Before the proposed increase in salaries takes place, we ought to have received our maximum dividend of 10 per cent.

The GOVERNOR: This is one way in which we hope to get it.

Mr. BOX: It is a question which has two sides to it. I do not object to paying our officers according to their merits, but I think the present recommendation should have been delayed till we get our 10 per cent., and then I should heartily approve of it.

Mr. BROWN: Our friend says there are two sides to the question. I take both, and, in doing so, quite agree in the recommendation of the directors. I think the best proof that they are looking after our interest is, that they are trying to get efficient officers, and that they are willing to pay them well for their services. Ordinarily it is left—and, I think, wisely left—to the discretion of the directors to advance merit in the officers when they find it, but the governor has given sufficient reasons to-day to justify the course taken on this occasion. There is one possible evil may arise from the course they propose—viz., that, if the shareholders vote this increase, it may generate the inference amongst the officers that it is the act of the proprietors, and not the act of the directors. But, as the governor has well put it, there will still be a discretionary power with the board, to make any extra allowance where special services seem to call for it. There is, however, one point which must not be overlooked, and that is, that sometimes, where increasing salaries are given, we find the energy and zeal of those who receive them decrease in a like proportion. I merely speak of it as a matter of warning, and not that I begrudge the proposed advance.

The GOVERNOR: My worthy friend forgets the power that we have over our officers. If we find them negligent in the performance of their duty we can get rid of them.

Mr. SHOVE: I think as our secretary has been so recently appointed, it is very early to propose to increase his salary. I shall, therefore, move—"That the recommendation of the board, as far as regards that officer, be not carried out until he has been in the service of the company for five years."

The amendment was not seconded; but, after some further remarks from shareholders, in approval of the recommendation of the directors, it was resolved—"That this general court do agree with and confirm the report of the court of directors with respect to the increase of salaries."

The GOVERNOR then moved—"That the court of directors be empowered and authorized to pay to Mr. Dalton, £200 a year from the period of his quitting the service of the company," which was adopted.

The retiring auditors were re-elected, and Mr. Sloper returned thanks.

The SECRETARY also acknowledged the vote increasing his salary. He said, many words from me would be quite out of place here. Permit me, therefore, to express to you simply and sincerely my thanks for the honour you have done me in confirming the arrangements which the directors were pleased to recommend on my behalf, and at the same time to assure you that my constant endeavour shall be to merit your confidence and to promote to the utmost of my ability, and at all times, the interests and the prosperity of the company.

Mr. GRAY moved and Mr. BOX seconded a vote of thanks to the governor and court of directors, which was cordially adopted.

The GOVERNOR: Gentlemen, on behalf of myself and brother directors I beg heartily to thank you for the kind manner in which you have received the vote proposed by Mr. Gray. It will be an inducement to us to renew and continue those exertions which we have hitherto made for the benefit of the company, and I only hope they may be as successful hereafter as they have been in the past.

## METROPOLIS GAS SUPPLY.

CITY COURT OF SEWERS, GUILDHALL, WEDNESDAY, NOV. 12.

A Special Meeting of the Commissioners was held this day to receive a report from the General Purposes Committee on the reference of the 4th November inst., as to the bill stated to be about to be introduced by the Great Central Gas Company, and on the question whether the commission should give notice to introduce a bill similar to that of the last session, for amending the Metropolis Gas Act, 1860—Mr. DE JERSEY, in the chair.

The CHAIRMAN said, the commissioners would remember that the Great Central Gas Company introduced a bill into Parliament last session for the purpose of removing doubts as to the power of the company under the Metropolis Gas Act, 1860. A question had arisen between the commission and the company on that subject, the latter contending that the provisions of that Act overrode the provisions of their own Act under which they were restricted to a maximum price for gas, of 4s. per 1000 cubic feet, and claimed the right to charge 4s. 6d. per 1000. The commissioners, on the other hand, contended that the company were still bound by their Act of Incorporation, so far as the price of gas was concerned, and had raised the question in a court of law. They also, during the last session, introduced a bill into Parliament to exempt the City of London altogether from the provisions of the Metropolis Gas Act. Both bills, however, were ultimately withdrawn, and the legal decision being against the commissioners, they had taken the case into a court of error, where it had been partially argued, and would come on again for further consideration at the end of this month. The commissioners were informed that the company, in anticipation that the judgment of that court might be against them, had given notice that they should reintroduce their bill next session, and the question now was, whether the commission would take a similar course in reference to their own bill? If the decision of the Court of Exchequer Chamber were in their favour, they would have a good *locus standi* to oppose the company's bill; but, if they thought it advisable to go to Parliament themselves, this being the last day for giving the requisite notices, it would be necessary to decide the point at once. For that reason, he had specially convened the court.

Mr. DAW (the chief clerk) read a report from the General Purposes Committee, to whom, on the 4th inst., it was referred to consider the question of the bill stated to be about to be introduced by the Great Central Company; and to take steps thereon as they might be advised, and to report to

the court. The committee stated that they had proceeded with the reference, and had been attended by the Remembrancer. After hearing that officer, and considering that the question at issue between the commissioners and the company was at present before a court of error, and would be decided about the end of this month, and having also had their attention drawn to the question whether the commissioners should introduce a bill into Parliament, to amend the Gas Act, 1860, similar to that introduced by them last session, but subsequently withdrawn—they thought that, under all the circumstances, it was not expedient to do so; but that the court should rather wait the issue of the appeal, and act thereupon, as the case might require. Nevertheless, should the court not agree with them, but consider it advisable to reintroduce their own bill into Parliament, this being the last day on which notices could be given, they had directed the clerk to call this special court, for the purpose of considering the same.

The CHAIRMAN moved—"That the report of the committee be agreed to."

Mr. GREEN: That is to do nothing?

The CHAIRMAN: Not to give the notices.

Deputy ELLIOT: Who is it that is moving in this matter? Who makes the appeal to the Court of Error?

The CHAIRMAN: We do. The decision of the Court of Common Pleas was against us; and we removed the case, by writ of error, to the Exchequer Chamber, under the advice of counsel.

Mr. GREEN: I suppose, we shall still be at liberty to oppose the gas company's bill?

The CHAIRMAN: Quite so; and, if the decision of the court is in our favour, we shall have a good *locus standi* for doing so.

Mr. GREEN: That seems to me the soundest way of proceeding.

The motion was put, and carried; and the court adjourned.

### BERMONDSEY VESTRY, MONDAY, NOV. 3.

Mr. SCHOMBERG, inspector, attended, and stated that, of the 28 lamps found out during the last quarter, 17 only were in the district supplied by the Surrey Consumers Gas Company. Of these, two were from stoppages in the service; three, water in the service; four, blown out; three, turned off; one, lamp-post pulled down; and four, unaccounted for. He submitted that the company ought not to be fined for four blown out and one pulled down.

Mr. NOEHMER said that the fines were so small (only 6d. per lamp) that he should have thought it hardly worth the while of Mr. Schomberg to attend. He then moved—"That the fines should be enforced in each instance."

Mr. STRATFORD seconded, remarking that the lighting now was most satisfactory, and that the inspector did all he could to make it perfect; but the fines were so small, that it was hardly worth while taking any trouble about them.

Mr. DARNELL thought that, as the lighting was so good, it would be very unwise and very wrong to enforce the fines, although they were so trifling.

The motion was then put, and agreed to by seven votes against three.

### ROTHERHITHE VESTRY, TUESDAY, NOV. 4.

The question of continuing the officer of gas testing was set down for reconsideration.

The CHAIRMAN, having taken the opinion of the clerk, said that, before they could appoint such an officer, there must be a notice of motion to revoke the resolution whereby it was resolved to discontinue the officer.

At the close of the meeting, Mr. ARNOLD gave the requisite notice of motion to revoke the former resolution, so that, at the next meeting, the subject might be fully discussed.

### ST. OLAVE'S DISTRICT BOARD, TUESDAY, NOV. 4.

The Gas Committee, having found it necessary to appoint an arbitrator in the dispute with the Surrey Consumers Gas Association, Mr. Hughes was appointed accordingly.

The following letter was read from the Surrey Consumers Gas Company:—

Nov. 3, 1862.

Dear Sir,—I am instructed by the board of directors of this company to draw your attention to the letter which I addressed to you, under date of the 4th of July last. The board decline to continue after Christmas the supply of gas to St. Olave's on the principles and terms now in operation. You will perceive by the account sent in for the past quarter that the two lamps to which meters are attached under the railway arches give a consumption largely at variance with the average consumption; and the board are convinced from their experience in this case, and from their general observation, that there is no uniformity and no equity in dealing with public bodies on this principle. I am, therefore, directed to give you this final notice that the present contract will not on any account be continued beyond Christmas next, and that unless you previously fix a meter to each night lamp in your district, you will thenceforth be charged £4. 5s. per lamp per annum, according to the terms of my letter of the 30th of May last. With respect to the thirty-four day and night lamps under the arches, the board require that meters shall be fixed so that the whole of the gas consumed under the arches shall be measured and registered. In the event of your board not fixing these meters before Christmas, the company will thenceforth charge you at the rate of £8 per lamp per annum by equal quarterly payments, for the supply of gas only. I am, &c.,

R. Slee, Esq. W. P. BODDY.

Referred to the Gas Committee.

### WANDSWORTH DISTRICT BOARD, WEDNESDAY, NOV 5.

A report was presented by Mr. F. W. BEAUMONT, gas-examiner. It was stated that the gas of the Phœnix Company was, at Kennington Lane, on the 22nd ult., equal to 15·81 candles, and on the 29th, 16·28. It continued variably ammoniacal. It having been suggested that in his experiments he should try whether pressure might not be lost between the taps and the meters, he placed pressure-gauges in a lamp, and found that this was the case to a certain extent, and this would call for an addition to the allowance made for the pressure requisite to work the meters only. He was, therefore, compelled to defer his general report until the next board meeting.

In reply to the CHAIRMAN,

Mr. BEAUMONT stated that the difference in the pressure was about a half a tenth.

A resolution was unanimously agreed to that Mr. Beaumont should be requested to report the result of his experiments at the next meeting.

## REPORT ON THE RESULTS OF EXPERIMENTS

### TO ASCERTAIN THE CONSUMPTION OF GAS AT THE PUBLIC LAMPS, AND ON THE APPLICATION OF THE CARBURATING PROCESS, &c., &c.

*To the Honourable the Committee upon General Purposes of the Commissioners of Sewers of the City of London*

*Sewers Office, Guildhall, Nov.* 3, 1862.

Gentlemen,—In pursuance of your reference, I have taken measures to ascertain the amount of gas consumed at the public lamps within your jurisdiction; and also, in conjunction with your medical officer of health, Dr. Letheby, to ascertain when deficiency of light is complained of, where carburators are affixed to the public lamps, if it be attributable to the fault of the gas company or the Carburating Company.

Thirty-eight meters have been affixed, which register the consumption of gas at forty-two public lamps—the situations of which include some of the highest as well as the lowest surface levels within the City.

Of the meters—

26 are affixed upon lamp-columns.

8 are placed beneath the ground at the base of the columns.

4 are attached to the brackets of lamps projecting from the walls of buildings.

The first meter was affixed on the 2nd of September, and thirty-six were affixed by the first of October; the remaining two on the 21st of October. All the following statements and averages are from observations made between the 2nd of September and the 25th of October inclusive.

Seven meters were affixed to lamps at which, by the terms of the contract with the company, 5 cubic feet per hour were to be consumed: these are without carburators, and are supplied with gas by the Chartered Gas Company. Thirty-one are affixed to lamps consuming, according to contract, 3 cubic feet per hour: they are in all cases fitted with a carburating apparatus, and are supplied with gas by the Great Central Gas Company.

The indices of the meters have been carefully recorded from time to time, and the averages of consumption throughout the experiment have been found to be as follows:—

For the first three nights after the meters were affixed—

| | Cubic Feet per Hour. |
|---|---|
| Of the 31 meters to the 3-feet burners, 20 showed a consumption of | 2·59 |
| 11 showed a cosumption of | 3·33 |
| The 6 meters affixed to the 5-feet burners showed a consumption of | 4·68 |

The twenty meters to the 3-feet lamps then began to register, like the others, more than the stipulated quantity of gas; those upon the 5-feet lamps continued without marked alteration; the average of the whole time showing that—

| | Cubic Feet per Hour. |
|---|---|
| The burners under contract to be supplied with 3 cubic feet of gas per hour consumed | 3.35 |
| The burners under contract to be supplied with 5 cubic feet of gas per hour, consumed | 4·69 |

The quantity consumed from hour to hour and at different lamps has been found to vary considerably.

With 3-feet burners, the mean range of consumption during the night has been from 1·83 to 6·30 cubic feet per hour.

With 5-feet burners, from 3.65 to 7·31 cubic feet per hour.

These are the extremes which have been observed, and there has been every variety in the rate of consumption per hour between those limits.

In some lamps there has been less than the stipulated quantity consumed for a few days; then a large increase has taken place for a few subsequent days, and then the consumption has fallen to about its average quantity. In a few instances, unusually large quantities of gas has passed through the meters between the hours at which registrations were made, which can only be accounted for, either by those lights burning much later, or by their being lighted earlier, than the contract requires, or by escape during the day.

In one instance, as much as 20 feet of gas passed through the meter between the time of extinguishing the light in the morning and lighting in the evening.

The quantity of light given at the public lamps varies, therefore, considerably: and that variation is not only between different lamps, but at the same lamp at different periods of the night, and will account partially for the extreme differences of opinion, sometimes publicly stated, as to the efficiency or non-efficiency of the public lighting.

It having been reported to me that there was a manifest difference between the light afforded by those lamps having meters, and those without, and it having been likewise noticed by Dr. Letheby and myself, we have taken circuits of inspection, and found that it was very evident indeed that such was the case both at lamps with and without carburators. Time, and the means at my disposal, have not yet permitted experiments to be made, to ascertain the exact consumption at lamps without meters; but the mean of a considerable number of rough observations taken by Dr. Letheby and myself, to ascertain the distance at which a given object was visible, showed that—

| | Strength of Light. Without Meters. Yards. | With Meters. Yards. |
|---|---|---|
| At lamps with carburators (3 cubic feet per hour, contract supply) | 4·378 | 5·512 |
| At lamps without carburators (5 cubic feet per hour, contract supply) | 4·758 | 5·925 |

These results show, with regard to the lamps fitted with carburators, that those with meters gave about 58 per cent. more light than those without meters.

And with regard to lamps without carburators, that those with meters gave about 55 per cent. more light than those without meters.

Also that the lamps with carburators and with meters, consuming nominally 3 cubic feet of gas per hour, gave superior light to lamps without meters burning nominally 5 cubic feet of gas per hour. And that the lamps with carburators gave less light than those without carburators, when compared under similar conditions in respect of meters.

These observations were 125 in number, and were made between the hours of 8.30 p.m. and midnight.

A very few observations only, as to pressure, have been made at different places, from which it will be seen that—

| | The Pressure had A maximum of | A minimum of |
|---|---|---|
| In the district of the Great Central Gas Company | 19/10ths | 7/10ths |
| In the district of the Chartered Gas Company | 14/10ths | 6/10ths |

The pressure has been taken between sunset and sunrise only.

It should be observed that in no case was there any loss of pressure by the application of the carburating apparatus.

I requested, on behalf of the Commission, the co-operation of the police, which was at once afforded me by D. W. Harvey, Esq., the Commissioner of City Police, and I have been furnished by him each morning with an account of all the defective lights which were observed by the constables on the preceding night.

A list of the lamps having meters affixed has also been furnished to the Commissioner of City Police, with the information that such lamps might be considered *as standards* by which the sufficiency of light given by the other lamps might be judged of by the police constables.

During the period over which these observations have been made, 133 complaints have been made by the police of defective lighting, an analysis of which gives:—

| | |
|---|---|
| Lights not lighted | 35 |
| Ditto feeble | 11 |
| Ditto went out | 87 |

The reports of the Gas Companies upon these complaints have not hitherto been made sufficiently in detail to enable me to give you a satisfactory account of the causes of defect.

I have, however, in all the cases, had examinations made of the fittings and carburating apparatus, the result of which shows that, out of the 133 complaints—

In 89 cases no fault could be discovered in the carburator or fittings.

In 12 cases the apparatus was out of order, or wanting in a due supply of naphtha.

In 26 cases there were stoppages in the fittings.

These examinations were made in most cases after mid-day—the returns from the police only reaching my office about 10 a.m.—and I am unable to state whether or not, previously to the examination by my assistants, the companies had noticed these defects, and done anything to remedy them.

The stoppages in the fittings will, of course, account for the deficiency of light in the 26 cases where such stoppages were discovered; but, with regard to the remaining 101 cases, no positive reason can be alleged for the feebleness or extinction of the light. It is most probably attributable to the wind acting upon a reduced flame, but whether such reduction of flame is owing to the carburating apparatus (where they are affixed), or to the small amount of gas consuming at the actual moment of extinction is uncertain, although there appears to be nothing in the structure of the carburating apparatus which can possibly interfere with the issue of the gas, even if, in respect of quantity or quality of naphtha, the apparatus might be deficient.

There has not been a single instance of complaint of extinction, or feebleness of light, from any lamp to which a meter is affixed.

The total number of lamps in the City is 2884.

The total number of complaints of light during 52 days was 133; this is at about the rate of 933 per annum, and there, therefore, is, upon the average, a defect to about 2½ lights nightly out of 2884 public lanterns.

With regard to the naphtha—specimens taken from the public lamps have been furnished to Dr. Letheby, whose report upon that branch of the subject is subjoined.

In the foregoing pages, I have, I believe, drawn your attention to the whole of the important facts elicited by the experiments, and to those points that may be useful to you in considering the references made to you by the commission.

And have the honour to remain, gentlemen, your obedient servant,

W. Haywood.

*Report by Dr. Letheby on the Quality of the Naphtha supplied to the Carburators.*

Eighteen samples of the liquid from the carburators have been submitted to examination, and the following are the results:—

In three cases, the liquid was water slightly tainted with the odour of naphtha.

In the other cases, the liquid was a naphtha or petroleum of varying density from 888 to 840.

The boiling-points ranged from 230° Fahr. to 280°.

When tested in the carburators, by passing coal-gas over the naphtha at the rate of 3½ cubic feet per hour, it was found that the proportion of hydrocarbon volatilized by the gas during the first twenty-four hours ranged from 1·43 grains per cubic foot to 4·73 grains, and that the increase in the illuminating power was from 6 to 24 per cent., but that this proportion rapidly declined.

The results, therefore, of this examination are—

1. That in one-sixth of the cases there was no naphtha whatever, but merely water in the carburators; and

2. That in no instance was the naphtha of the quality necessary to give the desired increase of illuminating power to the gas; for I have already ascertained that the naphtha should give at least 6·5 grains of volatile hydrocarbon to each cubic foot of the gas to raise the illuminating power to the required standard of 30 per cent. above the ordinary quality.

That this can be accomplished without difficulty or uncertainty is manifest from the fact, that a gallon of the naphtha of proper strength will continuously supply about 6·5 grains of hydrocarbon to each cubic foot of 9000 cubic feet of gas. Properly distributed, therefore, a gallon and a half or two gallons of good naphtha should be sufficient for a year's consumption of gas at each lamp.

At present, however, the supply is deficient both in quality and quantity, and the results are, therefore, unsatisfactory.

I have the honour, &c.,

Hy. Letheby.

Table *of the Properties of Eighteen Samples of Naphtha taken from the Carburators at the Public Lamps in the City of London, in October*, 1862.

| Number of Sample. | Colour of Sample. | Specific Gravity. Water = 1000. | Boiling-Point. (Fahr.) | Gives off Inflammable Vapour at (Fahr.) | Loss from Evaporation when exposed to Air for 24 Hours. | Amount yielded to each Cubic Foot of Gas. | Increase of Illuminating Power. |
|---|---|---|---|---|---|---|---|
| | | | Degrees. | Degrees. | Per Cent. | Grains. | Per Cent. |
| 1 | Brown. | 878 | 276 | 100 | 4·8 | | |
| 2 | „ | 864 | 275 | 91 | 6·8 | | |
| 3 | Amber. | 1003 | 212 | — | — | 1·43 | 6·3 |
| 4 | „ | 1002 | 212 | — | — | | |
| 5 | Brown. | 893 | 275 | 104 | 4·0 | | |
| 6 | „ | 884 | 268 | 98 | 4·6 | | |
| 7 | „ | 841 | 256 | 80 | 5·9 | | |
| 8 | Amber. | 840 | 230 | 60 | 10·2 | | |
| 9 | „ | 1003 | 212 | — | — | 2·62 | 12·0 |
| 10 | Brown. | 880 | 266 | 96 | 5·8 | | |
| 11 | „ | 884 | 273 | 100 | 5·7 | | |
| 12 | „ | 888 | 280 | 99 | 5·9 | | |
| 13 | „ | 826 | 220 | 60 | 10·2 | | |
| 14 | „ | 838 | 237 | 81 | 8·8 | | |
| 15 | Amber. | 834 | 231 | 80 | 9·8 | | |
| 16 | „ | 828 | 248 | 83 | 7·9 | 4·73 | 24·0 |
| 17 | Brown. | 870 | 256 | 80 | 6·9 | | |
| 18 | „ | 862 | 257 | 80 | 7·8 | | |

The samples, Nos. 3, 4, and 9, were merely water coloured with naphtha.

Conclusions.

We must, in the first place, beg to remark, that the results of these experiments do not militate against the opinions we have before expressed of the conditions under which public lamps should be lighted; although, if they are taken without reference to other experience, they might lead, in some respects, to a somewhat different conclusion: and it must be said of them, that a far more varied and extensive series of observations, spread over a greater length of time, will be necessary before such observations as these can alone be made the basis of final and positive conclusions.

We have, therefore, together, well considered the general results of the present inquiry in conjunction with the observations and reports made by us since the first experiment in carburating gas at the public lamps in Moorgate Street, in July, 1860, to the present time, and are of the following opinion upon the various points now before the consideration of the committee:—

That, with a view to insuring the supply of the full amount of gas contracted for, we are of opinion that it can only be effected in one of two ways, namely, either by the direct and nightly examination of the quantity of gas actually issuing from various burners, or by affixing a meter to each lamp. Both of these means will be attended with expense: the former with great expense, and also with somewhat uncertain results, inasmuch as averages would have to be relied upon; and we think the second method will be the least expensive and the most reliable. It is probable, also, that the rental of a meter to each lamp, if provided and maintained by contract, would not be a considerable annual charge; indeed, evidence has of late years been adduced, both actually and inferentially, to show that economy in the consumption of gas would in this way result; but, above all, it would set at rest the doubts which now prevail in respect of the quantity of gas supplied to the lamps, and so far the adoption of the plan would be satisfactory.

Under such an arrangement the commission should undertake the entire charge of their lamps, including the lighting and extinguishing the same. They can then call upon the companies to supply any given quantity of gas per hour to the public lamps, and will be enabled to adopt, without hindrance, any improvement in respect of burners or other contrivances that science or experience may hereafter suggest as a means of increasing the power of the light, and economizing the consumption of gas.

That, as regards the carburating process at the public lamps, judging from the experiments made in Moorgate Street, and those which have been conducted elsewhere, we have no doubt whatever that it may be successfully applied if the proper amount of gas is afforded, and a due supply of naphtha of a proper quality is given; and that, under these two conditions, a considerable saving may be effected in the cost of public lighting; but it is of the utmost importance, as regards the success of the process, that more precise arrangements should be adopted for the maintenance of the proper quantity and quality of naphtha in the carburators than have hitherto existed.

We have the honour to remain, gentlemen, your obedient servants,

William Haywood, Engineer.
Hy. Letheby, Medical Officer of Health.

## ON THE DIFFERENT VARIETIES OF BURNERS USED FOR GAS LIGHTING; AND RESEARCHES ON THE BEST CONDITIONS FOR THE COMBUSTION OF GAS.

By M.M. Paul Audouin and Paul Bérard.

The 10th and 16th articles of the old contract for the lighting of the City of Paris contained the following conditions:—

The lighting shall be effected with coal-gas.

The gas shall be perfectly purified.

Its illuminating power should be such that under an ordinary pressure it should give, with the burners employed for the public lights, the undermentioned intensities:—

First series, consuming 3·5316 cubic feet of gas per hour, 0·77 of the light of a carcel lamp, burning 648 grains of oil per hour;

Second series, consuming 4·9442 cubic feet of gas per hour, the light of 1·10 of the same lamp;

Third series, consuming 7·0632 cubic feet of gas per hour, the light of 1·72 of the same lamp.

The minimum dimensions of the flames of these burners were required to be,

For the first series, 2·25 inches wide by 1·14 inches high.
" second " 2·63 " 1·27 "
" third " 3·70 " 1·77 "

The operations of the Parisian Gas Company were scarcely organized, when it was acknowledged that these conditions, to which it had subscribed without discussion, were not fulfilled. As early as 1856, experiments for the purpose of verification were instituted by order of the Prefect of Police; the practical result of which demonstrated that the gas consumed in the public lights of the city did not realize the illuminating power prescribed by the contract. The figures, nevertheless, which had been adopted by common accord, resulted from the experiments made in 1845 by Messrs. Arago, Fresnel, and Mary, the accuracy of which were incontestible. The municipal administration, therefore, found itself placed in the presence of assertions of the company, declaring that the gas, manufactured under the most favourable conditions, could never attain the illuminating power stipulated for in the contract, which it had engaged to deliver for consumption, with the burners used for the public lamps. A commission was charged with the examination of this difficulty. It was ascertained that the ordinary coals of the north of France, of Belgium, and of England—such as were daily employed in the manufacture of gas in Paris and elsewhere—could not yield the illuminating power prescribed; and would only furnish about one-half of the light which the contract obliged the company to supply.

The commission caused to be distilled, under its own eyes, a great number of different coals, in the experimental work which the Parisian company had constructed at La Villette. The production of the gas was effected in the ordinary manner, in fourteen retorts; and the gas being received and measured in a special gasholder, its average illuminating power could be ascertained with precision. The commission ascertained that the above-mentioned coals were not such as to fulfil the conditions imposed by the contract; but it also ascertained that certain coals of Commentry furnished a gas nearly capable of realizing them; and it found, in going back to the precise conditions under which the experiments of Messrs. Arago, Fresnel, and Mary were conducted, that the gas upon which these three observers experimented had been produced from the coal of Commentry.

The commission having also ascertained that, by enlarging the slits of the burners then used for the public lights, the illuminating power of the gas was considerably augmented, M. Dumas, its president, was charged, jointly with with M. Regnault, to continue the inquiry that it had commenced. The verifications that were thus effected were sufficient to enable the municipal administration to regulate the difficulties which existed between it and the gas company; but further researches were necessary to lead to a definitive modification of the contract.

Upon these facts, the extension of the service of the Parisian Gas Company to the lighting of the suburban consumers annexed to Paris, rendered a revision of the clauses of the contract relative to the definition of the illuminating power possible; and it led Messrs. Dumas and Regnault, who were officially charged with it, into extended researches, with the view of determining this question. Having associated us with them in the execution of this mission, they have been kind enough to authorize us to publish the results.

The starting-point of the new investigations was taken from a purely municipal point of view. Gas replaces oil for lighting. There are *octroi* duties upon oil for burning and upon coal employed for the production of gas; a certain equilibrium should be established between them. On the other hand, considering the interests of the consumers, it appears natural to take as the term of comparison the oil-light which is in general use, to establish the value of the gas-burner which is put at their disposal. These conditions decided Messrs. Dumas and Regnault to define in the following manner the process and the verifying apparatus which it was necessary to create and to study:—"Two flames of equal intensity, the one produced by a carcel lamp and the other by a gas lamp, burning as nearly as possible in the same conditions, to determine the consumption of oil and of gas in a given time in each of these apparatus." In practice, therefore, it was necessary to choose a model burner for gas which, by its form, approached nearest to the carcel lamp; to burn the gas like oil in a lamp having a double current of air; and lastly, to place the flames in a situation that was invariable, so that their intensities might be equally maintained, leaving only two figures to be noted at the termination of the experiment, the number of grains of oil and the number of feet of gas burned. These two numbers would represent the equivalent of the oil and gas employed with regard to their illuminating power. Subsidiarily, it was necessary to find which burner was the most favourable for the consumer. Some hundred burners were tried, either in comparing one with another, taken as unity, or in comparing them directly with the carcel lamp. The major part of the results obtained in these long investigations, were performed in the laboratory of the Sorbonne, and will be described in the first part; the rest, which we are permitted to annex, will form the second part of this paper.

## First Part.

### *Researches on the Burners to be preferred for Public Lighting.*

The first difficulty to be overcome in photometric observations on gas, is to take a fixed basis for comparison. For a long time past the carcel lamp has been employed for this purpose, on account of the relative constancy of its intensity; but, it was soon discovered that this intensity depends upon a multitude of circumstances which we have had to analyze. The principal are the height of the wick, its nature, and the height of the contraction in the glass above the level of the wick. Attempts have been made to determine the influence of each of these conditions upon the intensity of the consumption of the carcel. The lamp was placed upon a balance at a distance of one mètre (39·37 inches) from the photometer; it was counterpoised, and the time noted. At the same distance from the photometer a gas-burner, with 20 holes and a glass chimney, was placed, and its intensity was regulated so as to equal that of the lamp, while a meter served to determine the consumption of gas by the burner. To ascertain the relative illuminating power of the lamp in each of these trials, the consumption was reduced to the same number (648 grains of oil), by the rule of three. It is evident that the moment when the lamp attained its maximum illuminating power it corresponds to that when the greatest consumption of gas is necessary to obtain the same light.

The following is the table of these trials:—

Experiments on the Carcel Lamp,

*Showing the Variation in the Consumption according to the Height of the Wick, the Neck of the Glass Chimney being uniformly 0·28 inch above the Top of the Wick.*

| Height of Wick. | Fine Wick. | | Average Wick. | | Thick Wick. | |
|---|---|---|---|---|---|---|
| | Consumpt of Oil per Hour. | Consumpt of Gas equivalent to a Carcel Lamp burning 648 Grains. | Consumpt of Oil per Hour. | Consumpt of Gas equivalent to a Carcel Lamp burning 648 Grains. | Consumpt of Oil per Hour. | Consumpt of Gas equivalent to a Carcel Lamp burning 648 Grains. |
| Inches. | Grains. | Cub. Ft. | Grains. | Cub. Ft. | Grains. | Cub. Ft. |
| ·15748 | 416 | 3·3905 | 463 | 5·4742 | 493 | 3·4964 |
| ·22822 | 509 | 6·1805 | 555 | 6·8153 | 555 | 5·6155 |
| ·31496 | 586 | 6·9223 | 648 | 6·5337 | 648 | 6·7810 |
| ·39370 | 617 | 6·7104 | 648 | 7·0636 | 694 | 6·8516 |
| ·47244 | 540 | 6·0040 | 617 | 6·8153 | 740 | 7·4873 |
| ·55118 | 586 | 6·2512 | 617 | .. | 787 | 7·6286 |
| ·62192 | 555 | 6·3572 | 694 | 6·5691 | 740 | 6·6750 |
| ·70866 | 478 | 5·4036 | ... | .. | 648 | 6·7810 |

Experiments on the Carcel Lamp.

*Showing the Variation in the Consumption according to the Position of the Glass Chimney, the Height of the Wick being uniformly 0·28 in.*

| Height of Neck of Chimney-Glass above the Level of the Wick. | Fine Wick. | | Average Wick. | | Thick Wick. | |
|---|---|---|---|---|---|---|
| | Consumpt of Oil per Hour. | Consumpt of Gas equivalent to a Carcel Lamp burning 648 Grains. | Consumpt of Oil per Hour. | Consumpt of Gas equivalent to a Carcel Lamp burning 648 Grains. | Consumpt of Oil per Hour. | Consumpt of Gas equivalent to a Carcel Lamp burning 648 Grains. |
| Inches. | Grains. | Cub. Ft. | Grains. | Cub. Ft. | Grains. | Cub. Ft. |
| —·07874 | 277 | ·4943 | 277 | ·3884 | 231 | ·8122 |
| +·11811 | 385 | 2·2249 | 324 | 2·0131 | 416 | — |
| ·27559 | 555 | 6·6044 | 601 | 5·6861 | 740 | 6·1805 |
| ·47244 | 601 | 7·0282 | 648 | 7·0636 | 771 | 6·5691 |
| ·74803 | 648 | 5·3330 | 694 | 6·1805 | 787 | 5·7920 |
| ·94488 | 709 | 11·1250 | 694 | 5·6861 | 833 | 4·9445 |
| 1·14173 | ran over | .. | 787 | 4·6972 | .. | — |

These tables prove—

1. That, by increasing the height of the wick, the consumption of oil increases, as well as the intensity of light, up to a certain point (·3937 inch), when these two quantities diminish;

2. That the elevation of the contraction of the glass chimney tends to augment the consumption of oil in a continually increasing proportion; but there is a point where, though the consumption increases, the intensity diminishes. There is, consequently, a height of the neck of the glass which corresponds to the maximum illuminating power of the lamp;

3. That a wick of a medium thickness is the most advantageous, as for equal consumption it gives the most light;

4. That there is no proportion between the consumption of oil and gas, except when approaching a consumption of 42 grammes (648 grains) of the former per hour, when the numbers representing the illuminating power are almost constant. In fact, the relation between the consumption of oil and the consumption of gas has been each time multiplied by the number 42. If this relation had been constant, we should always find the same number in the column in which is inscribed the consumption of gas to equal those of a carcel lamp burning 42 grammes, in the various conditions in which it was placed. It will be seen that this relation goes on increasing as the maximum of 42 grammes is approached; and that, when near this maximum, it is nearly constant. Thus, then, when a photometric observation is made on a burner, with the lamp as a standard, and it does not burn exactly 42 grammes during the trial, it is possible, by the rule of three, to reduce the consumption of the burner to what it would be if the lamp burned 42 grammes, but only in the case where the quantity of oil consumed was between 40 and 44 grammes. When the differences are greater, the calculation would give erroneous results. In the numerous photometric observations made by means of the lamp as a standard, the difficulty was felt of indicating in a general manner the conditions under which the carcel lamp would give a fixed and constant consumption. Two lamps, with wicks of the same diameter and the same capacity, may differ in their consumption and in their illuminating power. Besides, it is found that the temperature, the agitation of the air, the duration of the lighting, and the extent to which the lamp is more or less filled, have an influence upon the consumption. Thus, when photometric observations are made, in which the carcel lamp is used as the basis of comparison, it should first be submitted to the series of experiments which have been performed with that which served for these trials. It will then be known under what conditions an almost constant consumption may be obtained.

The consumptions of oil have always varied in the lamps we used within the normal limits that we have indicated, care having been taken to comply with the conditions which experience had shown to be necessary. The object of the results that we give is not, therefore, to determine in an absolute manner the conditions in which the lamp should be placed in making trials of gas, but the influence of those conditions upon its consumption and illuminating power.

*Experiments on Bat's-wing Burners.*

A series of ten burners (fig. 1) was used for these experiments, the dia-

Fig. 1.

meters of the nipples of which were increased gradually by ·01968 inch, from ·1771 inch to ·3543 inch. One of each sized nipple was made with slits, 1/254th, 1/127th, 1/84th, 1/63rd, 1/50th, 1/42nd, 1/36th, 1/31st, 1/28th, and 1/25th of an inch in width. The width of the slits of the burners employed for the public lamps up to January, 1861, had been as follows:—

| | |
|---|---|
| First series . . . . | 1/96th of an inch. |
| Second series . . . . | 1/89th " |
| Third series . . . . | 1/86th " |

Their consumptions of gas being—

| | |
|---|---|
| First series . . . . | 3·5316 cubic feet. |
| Second series . . . . | 4·9442 " |
| Third series . . . . | 7·0632 " |

Without in anything changing this agreed consumption of gas, and preserving the same diameters of the nipples employed, we sought for the width of slit which gave the highest illuminating power. As to the intermediate series, they have been also regulated to the adopted consumptions*. A standard burner for comparison was employed for each series, chosen from among the best of the same series; and, at the end of each experiment, the intensity of this standard burner was compared with the carcel lamp, in order to ascertain the illuminating power of the gas corresponding to each trial. The pressure under which the gas was burned was noted by a pressure-gauge fitted to the burner column. We give below a table of the results obtained with the three series of the burners adopted by the town for the public lights, and a curve which represents them graphically. Figs. 4, 5, and 6.

| Series No. 4. | | | | | Series No. 6. | | | | | Series No. 8. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Width of Slit. | Pressure. | Consumpt per Hour. | Intensity. Compared to a Burner with a Slit 1-50th of an Inch wide = 100. | Intensity. Compared to a Carcel Lamp burning 648 Grains. | Width of Slit. | Pressure. | Consumpt per Hour. | Intensity. Compared to a Burner with a Slit 1-50th of an Inch wide = 100. | Intensity. Compared to a Carcel Lamp burning 648 Grains. | Width of Slit. | Pressure. | Consumpt per Hour. | Intensity. Compared to a Burner with a Slit 1-50th of an Inch wide = 100. | Intensity. Compared to a Carcel Lamp burning 648 Grains. |
| Inches. | Inches. | Cub. Ft. | | | Inches. | Inches. | Cub. Ft. | | | Inches. | Inches. | Cub. Ft. | | |
| 1/254 | 1·31 | .. | 24 | .. | 1/254 | .. | .. | .. | .. | 1/254 | .. | .. | .. | .. |
| 1/127 | 0·88 | .. | 37 | .. | 1/127 | 1·19 | .. | 31 | .. | 1/127 | .. | .. | .. | .. |
| 1/84 | 0·61 | .. | 47 | .. | 1/84 | 0·49 | .. | 57 | .. | 1/84 | 0·83 | .. | 46 | .. |
| 1/63 | 0·22 | .. | 80 | .. | 1/63 | 0·24 | .. | 72 | .. | 1/63 | 0·39 | .. | 69 | .. |
| 1/50 | 0·13 | 3·5318 | 100 | 0·63 | 1/50 | 0·16 | .. | 91 | .. | 1/50 | 0·22 | .. | 81 | .. |
| 1/42 | 0·11 | .. | 102 | .. | 1/42 | 0·11 | .. | 97 | .. | 1/42 | 0·15 | .. | 90 | .. |
| 1/36 | 0·08 | .. | 107 | .. | 1/36 | 0·09 | 4·9535 | 100 | 0·86 | 1/36 | 0·12 | 7·0636 | 100 | 2·11 |
| 1/31 | 0·05 | .. | 103 | .. | 1/31 | 0·07 | .. | 98 | .. | 1/31 | 0·10 | .. | 101 | .. |
| 1/28 | 0·04 | .. | 102 | .. | 1/28 | 0·04 | .. | 96 | .. | 1/28 | 0·09 | .. | 95 | .. |
| 1/25 | 0·03 | .. | 103 | .. | 1/25 | 0·03 | .. | 95 | .. | 1/25 | 0·05 | .. | 94 | .. |

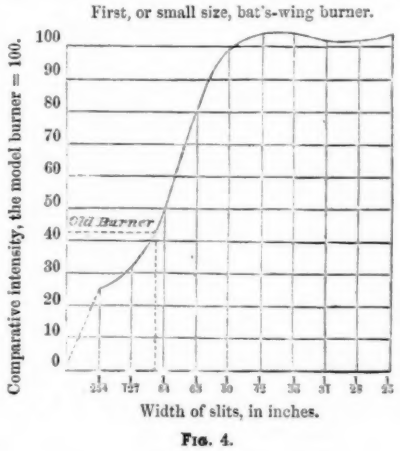



Fig. 4.

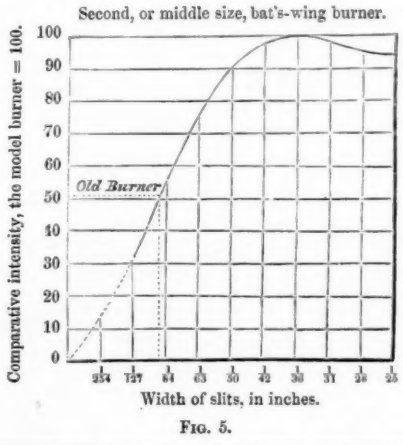



Fig. 5.

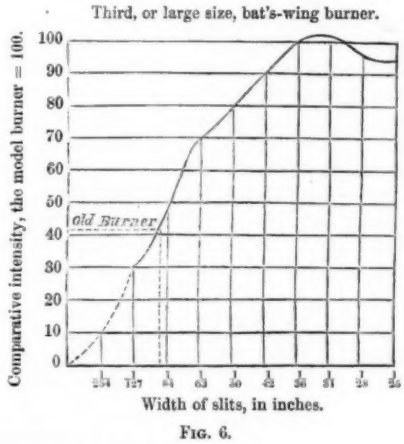



Fig. 6.

From these tables, it will be seen:—

1. That a maximum illuminating power is obtained, in all the three series, with a slit 1-36th of an inch wide;

2. That, in comparing the burner with a slit 1/254th of an inch wide with the burner of which the slit is 1/36th of an inch wide, it is found that, with the same consumption of gas, the intensities of the lights were in the proportion of 24/100ths = 4·1. *The same quantity of gas, when it is burned in a good burner, may, therefore, give four times the quantity of light it would do when burned in a bad burner;*

3. That the intensity of the light increases more rapidly than the dimensions of the slits;

4. *That the increase in the illuminating power takes place by a rapid*

* For the purpose of measuring exactly the diameters of the slits and of the holes of the burners used, a little apparatus was employed, consisting of, for the holes, a small conical needle, very finely tapered, and for the slits, a flat needle. With this apparatus, the width of the slits and the diameter of the holes may be measured with great precision. Figs 2 and 3.

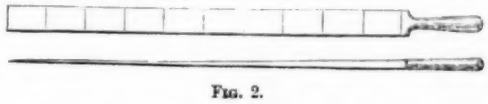


Fig. 2.

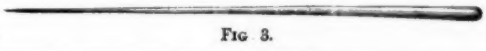


Fig 3.

*diminution in the pressure* (see, for example, in the fourth series, 33/2), and consequently by a diminution in the speed of the flow of gas during the combustion;

5. That the maximum effect in each series is produced by a current, or corresponds to the current produced by a nearly uniform pressure of from ·07874 to ·11811 of an inch.

It is also to be remarked, besides, that in burners with narrow slits the flame is very rigid and blue, while with the large slits it is large and white, slightly vacillating and tending to smoke.

The observations made in the intermediate series so completely agree with those we have just announced, that we consider it to be useless to detail the results furnished by them.

It remained now to be determined if each of the three series or descriptions of burners adopted by the town corresponded in maximum illuminating power with those of the intermediate series, using in each case the slits of the most advantageous dimensions. For this purpose, two modes were adopted. In the first, the burners of the four first series were regulated to a uniform consumption of 3·5316 cubic feet per hour, those of the two following series to 4·9442, and those of the last four to 7·0632 cubic feet. The intensities of these different burners were afterwards compared together in the manner adopted in the following table, which proves that the diameters of the nipples already used are the most advantageous:—

*Comparative Experiments on different Series of Nipples.*

| Consumpts | 3·5318 Cubic Feet. | | | | 4·9456 Cubic Feet. | | 7·0636 Cubic Feet. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Series | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Width of slits, in fractions of an inch | | | 1/36 | 1/36 | 1/36 | 1/36 | 1/36 | 1/36 | | |
| Intensities | | | 93 | 100 | 93 | 100 | 95 | 100 | | |
| Width of slits, in fractions of an inch | | | | 1/36 | 1/36 | 1/36 | 1/36 | 1/36 | 1/36 | |
| Intensities | | | | 93 | 100 | 100 | 87 | 100 | 81 | |

There are some difficulties attending the execution of this mode. In the nipples of large diameter, the instability of the flames where the consumption is small led to some uncertainties in comparing the illuminating power. Besides this, it was difficult to regulate the consumption to a given quantity. To arrive at the same result it was necessary to have recourse to another method, which consists in taking the same slit in each series of nipples (1/36th of an inch). By this means ten burners were tried, with nipples increasing gradually in diameter by ·01968 from ·1771 to ·3543 of an inch, and of which the slits were all of the same width. When one is accustomed to experiments of this nature, it is not difficult to regulate approximately a burner to a given consumption, according to the dimensions of the flame. By these means, a consumption from about 3½ to 4¼ feet per hour was obtained in each of the ten burners, and they were compared, one after another, to a standard argand burner, placed at the same distance from the photometer. This comparison was made by equalizing the luminosity of the two lights, for which purpose it suffices to vary within very narrow limits the consumption of the standard burner. The exact consumption of the standard burner and of the bat's-wing was then ascertained, and the consumption of this latter was reduced by the rule of three to the fixed and constant consumption of the standard (3·5316 cubic feet). It is clear, that the burner which under these conditions would give the same light with the least consumption of gas, is that which should be chosen. The consumption of each of the ten burners was gradually increased up to 8·8290 cubic feet; but, as the light produced by these large consumptions is much greater than that of the standard burner, and it is very important to maintain the latter within the limits of its normal consumption [3½ to 5¼ cubic feet], the bat's-wing under trial was placed at a greater distance from the photometer than that of the argand burner; and, in order to obtain results which could be compared with those precedingly obtained, the observed consumption of the bat's-wing was reduced by the rule of three to what it would have been if it had been placed at the same distance from the photometer as the standard burner.

| Numbers of the Series. Slit, 1-36th of an Inch wide. | I. | | | | II. | | | | III. | | | | IV. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Consumpt of the Burner under Trial for an Intensity = 100. | Consumpt of the Bengel Argand Standard Burner without Cone; 8-inch Chimney. | Pressure at the Burner during the Experiment. | Calculated Consumpt for 3·5316 Cub. Ft. by Standard Burner for equal Intensity of Light. | Consumpt of the Burner under Trial for an Intensity = 100. | Consumpt of the Bengel Argand Standard Burner without Cone; 8-inch Chimney. | Pressure at the Burner during the Experiment. | Calculated Consumpt for 3·5316 Cub. Ft. by Standard Burner for equal Intensity of Light. | Consumpt of the Burner under Trial for an Intensity = 100. | Consumpt of the Bengel Argand Standard Burner without Cone; 8-inch Chimney. | Pressure at the Burner during the Experiment. | Calculated Consumpt for 3·5316 Cub. Ft. by Standard Burner for equal Intensity of Light. | Consumpt of the Burner under Trial for an Intensity = 100. | Consumpt of the Bengel Argand Standard Burner without Cone; 8-inch Chimney. | Pressure at the Burner during the Experiment. | Calculated Consumpt for 3·5316 Cub. Ft. by Standard Burner for equal Intensity of Light. |
| | Cub. Ft. | Cub. Ft. | Inches. | | Cub. Ft. | Cub. Ft. | Inches. | | Cub. Ft. | Cub. Ft. | Inches. | | Cub. Ft. | Cub. Ft. | Inches. | |
| 1 | 6·2159 | 3·7083 | ·66929 | 167 | 7·3108 | 4·9091 | ·66929 | 149 | .. | .. | .. | .. | .. | .. | .. | .. |
| 2 | 5·0857 | 3·8496 | ·23622 | 132 | 6·6044 | 4·9091 | ·31496 | 134 | .. | .. | .. | .. | .. | .. | .. | .. |
| 3 | 4·4500 | 3·7790 | ·11811 | 118 | 5·7920 | 4·8738 | ·23622 | 111 | 7·6639 | 6·0040 | ·39370 | 127 | 9·5358 | 5·5449 | ·31496 | 114 |
| 4 | 4·3793 | 3·8496 | ·07874 | 113 | 5·1564 | 4·8358 | ·11811 | 106 | 7·5226 | 6·1099 | ·31496 | 123 | 9·5004 | 5·4742 | ·31496 | 115 |
| 5 | 4·4853 | 3·8143 | ·07874 | 117 | 5·1564 | 4·8358 | ·11811 | 106 | 6·9929 | 6·0746 | ·19785 | 114 | 9·1473 | 5·4036 | ·23622 | 112 |
| 6 | 4·4146 | 3·8143 | ·07874 | 115 | 5·1564 | 4·8358 | ·11811 | 106 | 6·8869 | 5·8980 | ·19685 | 116 | 8·9354 | 5·4389 | ·23622 | 109 |
| 7 | 4·4853 | 3·7437 | ·07874 | 119 | 5·1564 | 4·9445 | ·11811 | 104 | 6·3572 | 5·6508 | ·15748 | 112 | 8·8648 | 5·4036 | ·23622 | 109 |
| 8 | 4·3793 | 3·7083 | ·07874 | 118 | 5·1564 | 4·9445 | ·07874 | 104 | 6·1805 | 5·6155 | ·15748 | 110 | 8·6882 | 5·3683 | ·19685 | 107 |
| 9 | 4·2381 | 3·7790 | ·07874 | 112 ? | 5·0504 | 4·9091 | ·07874 | 102 ? | 5·9333 | 5·5449 | ·11811 | 106 | 8·1231 | 5·3330 | ·15748 | 97 |
| 10 | 4·3087 | 3·7790 | ·07874 | 114 | 5·2270 | 4·8358 | ·07874 | 108 | 5·8627 | 5·4742 | ·11811 | 106 | 8·4056 Smokes. | 5·5449 | ·15748 | 97 |

Thus the ten burners were successively experimented on with consumptions, in round figures, of 4·2379, 5·2974, 7·0632, and 8·8290 cubic feet per hour; and the illuminating power under these four conditions was compared with the fixed standard. It suffices, therefore, to tabulate the ten results obtained with each of these consumptions, to compare the ten burners with each other, and to ascertain which consumes the gas to the best advantage. To appreciate the true results of this table, it should be first observed that, in proportion as the dimensions of the nipples become larger, the flame becomes less and less fixed, and tends to smoke; and that these phenomena are more sensible when the consumptions are small than when they are great. This explains the irregularities that are to be met with in the results towards the end of the table, on account of the uncertainty that this phenomenon introduces into the experiments. This fact, which proves that in the cases of which we speak the combustion is incomplete, necessarily requires the elimination of the burners which produce it; so that choice must be made from amongst the results approaching nearest to that in which the combustion is most perfect; and some concession must be made in the form of the flame to the prejudice of the illuminating power. That being understood, it will be seen that in this table for a consumption of about 4·2379 cubic feet per hour, the fourth is the preferable series; for a consumption of about 5·2794 cubic feet per hour, the seventh series; and, for a consumption varying from 7·0632 to 8·8290 cubic feet, the eighth or ninth series should be chosen. These results are in accordance with those of the preceding table.

These experiments prove besides:—

1. That as the dimensions of the nipple increase, the consumption for the same illuminating power tends to diminish;

2. That there exists for each consumption of gas, a diameter of nipple which gives the greatest illuminating power that its consumption is capable of producing; and this proves, as might have been foreseen, that it is necessary to proportion the diameter of the nipple to the consumption, while retaining the slit of one-thirty-sixth of an inch wide, which is the most advantageous, as has been already observed. That the increase in the diameter of the nipple has little influence on the illuminating power, as, on examining the third column of the table, it will be seen that the estimated consumption for the same intensity of light varies only from 4·3851 to 3·7434, or 19 per cent., for diameters of nipples varying from ·2165 to ·3543 of an inch in diameter;

3. That in considering the figures, 113, 104, 106, and 107, in the fourth columns of the preceding table which correspond to an illuminating power equal to that of 3·5316 cubic feet consumed in a Bengel standard burner, it will be seen that the three last are substantially the same, which seems to prove that, for consumptions of between 4·9442 and 8·8290 cubic feet per hour, the gas cannot be better used with regard to its illuminating power, and that for smaller consumptions there is a loss of 13 per cent;

4. The verification of a law already observed will be found also in this table, and that is, *that the greatest illuminating power coincides with the lowest pressure.* In fact, for all burners and, for all consumptions, the maximum effect is produced with a pressure of from ·07874 to ·11811 of an inch. The same burner (7th series) gives for a consumption of 5·1561 cubic feet the maximum intensity with a pressure of ·1181 of an inch, but, when it consumed 6·3568 cubic feet, the pressure rose to ·1574 of an inch; and its illuminating power is inferior by 5 per cent. to the burner of the 9th series, which gave the maximum when burning 5·9330 cubic feet under a pressure of ·1181 of an inch. In other words, gas travelling at the same speed measured by the pressure-gauge gives the same illuminating power in whatever bat's-wing burner it is consumed.

(*To be continued.*)

## THE MERCHANDISE MARKS ACT, 1862.

25 & 26 Vict., c. 88.

A trader who has been accustomed to employ some mark by which the goods he deals in are known in the market, has always had a right to proceed at law or in equity against any one who, by imitating it, has passed off his own goods as those of such trader; but there has been no such thing as a property in a trade-mark, nor has there been any mode of proceeding criminally for forging or fraudulently using any trade-mark, except when a man has, by fraudulently selling goods as manufactured by a different person than the true one, committed the offence of obtaining money under false pretences. The object of the present Act is to protect the trader from trade fraud by more efficient means than those which now exist.

The Act makes certain offences misdemeanors, punishable by imprisonment or fine, and to others it attaches a pecuniary penalty. The offences which

are made misdemeanors are the following, provided they are committed with an intent to defraud, viz. :—

1. Forging any trade-mark.
2. Applying any trade-mark, genuine or forged, to any article not being the merchandise of the person denoted by such trade-mark, or whose trade-mark has been forged, or to any article not being the peculiar description of merchandise denoted by the trade-mark.
3. Applying any trade-mark, genuine or forged, to any case, wrapper, &c., in or with which any article shall be sold; or enclosing any article in any case, wrapper, &c., to which a trade-mark has been falsely applied, or which has thereon the trade-mark of any other person.

For the following offences, a pecuniary penalty is imposed :—

1. Selling any article knowingly with a forged trade-mark, or with a trade-mark used falsely, or without lawful authority.
2. Marking, with intent to defraud, any false description of the quantity or weight, &c., of any article, or of the place where it has been manufactured, or any false indication of the article being the subject of any existing patent or copyright.
3. Selling any article knowingly upon which, or upon the wrapper or case, &c., of which is put any false description of the quantity or weight, &c., of such article, or of the place where it has been manufactured.

These offences of selling are, however, only to apply to sales after the 31st of December, 1863. Moreover, when any name or expression has been generally used to indicate the article to be of some particular class of manufacture, the application of such name or expression, though not strictly true, to any article, or the selling of the article with such name or expression, is not to be an offence within the Act.

The conviction of any person for any of the offences given by the Act, is not to prejudice any remedy the party aggrieved may have at law or in equity; but, on the contrary, a distinct cause of action for damages is expressly given to such party against any one guilty of forging or applying any forged trade-mark, or enclosing any article in any wrapper or case having thereon the trade-mark of any other person. This last is certainly peculiar, and the policy of it may be questionable. It gives a cause of action against a person for using the trade-mark of any other, although such person against whom it may be brought has not been guilty of any fraud.

By analogy to the Patent Act of 1852 (15 & 16 Vict., c. 83), courts of common law are invested with powers to grant injunctions and to order inspection.

There is another important provision in the Act, to which attention must be called. In the sale of any article after the 31st of December, 1863, with a trade-mark, or with a description of the number, quantity, measure, or weight of such article, or of the place where manufactured, the vendor will, in the absence of any writing to the contrary, be deemed to warrant the genuineness of such trade-mark, and that it is not wrongfully used, and also the truth of such description.

When the bill which has resulted in the present Act was before the committee of the House of Commons, it was proposed to establish a system of registration for trade-marks, and also to introduce the principle of reciprocity with foreign nations; but both these propositions were negatived. This reciprocity has, however, lately been secured by a treaty with Belgium, under which the subjects of this country and Belgium are respectively protected in the use of their trade-marks.

---

DUMAS AND BENOIT'S MODE OF APPLYING THE ELECTRIC LIGHT FOR MINING PURPOSES.—The apparatus consists essentially of three parts—a battery, a Ruhmkorff's coil, and a Geissler's tube—the whole arranged so as to produce a sufficient light to illuminate the miner, and allow him to work in atmospheres where other lights fail. The light produced is cold, or, rather does not heat the tube in which it is produced, and gas has no access to it; it is quite isolated. The apparatus is as compact as ordinary lamps, and there is no injurious emanation. It can be lighted or extinguished at will. It can work for twelve consecutive hours without diminution, and without requiring any charge. The workman has only to agitate the carbon occasionally, by means of a rod. The greatest difficulty consisted in being able to associate a battery of such intensity that the weight of the apparatus was as small as possible, the light produced of the greatest regularity, and its duration at least twelve hours. The present form of the apparatus, which may be still further diminished, is already so small, that the miner can carry it without inconvenience, like a small carpet-bag. The authors point out the advantages of such a mode of illumination, and state that the results obtained in using Becquerel's fluoressence-tubes have led to the expectation that the luminous effects may be greatly improved, both as to duration and intensity.—*Comptes Rendus*, Sept. 8, 1862.

DISTRICTING OF THE MANHATTAN AND METROPOLITAN GAS COMPANIES IN NEW YORK.—Gas consumers in this city have long been hoping for the completion of the Metropolitan Gaslight Company's works, thinking that the vigorous competition which seemed imminent would bring the other gas companies to a sense of their duty. It is known that, at the time the Metropolitan Company was chartered, the old companies regarded the new corporation in the light of an unwelcome intruder. Consumers, however, looked upon the prospect of having an opposition gas company as a consummation devoutly to be hoped for; and, when the first piles were driven on the magnificent lot of the Metropolitan Company, some began to dilate upon the relief from imposition which the inauguration of the new company would promise. These hopeful individuals will look somewhat aghast on learning that a virtual amalgamation of the Manhattan and Metropolitan Companies has taken place; and these two corporations, which but a short time ago seemed determined to wage a bitter war upon each other, have, after the lapse of a few months, determined to smoke the calumet of peace, and to make a division of the territory between the boundaries of the New York and Harlem Companies. The Metropolitan Company have bought the new works lately erected at Sixty-sixth Street, which have already cost some 300,000 dollars. The district of the new company is to extend from Thirty-fourth Street to Harlem, while the Manhatten agree to confine themselves to the district from Grand Street to Thirty-fourth Street. The latter company take a considerable amount of stock in the Metropolitan, and thus settle the differences which existed between the rival concerns. The Metropolitan Company will assume the gas-tax. This virtual union of the two companies dashes the hopes of those who were looking for the results of competition in the reductions in price, and will disappoint the expectations of many. One good, however, will be accomplished by it. It will be the means of introducing into this city the excellent gas-meters of Code, Hopper, and Co., and R. H. Gratz and Co., of Philadelphia, who are large stockholders in the Metropolitan, but whose meters have heretofore been ignored by our city companies. Whether the coming winter will witness the granting of any more charters for gas companies, we are not prepared to say; but, as the people have been so completely disgusted with the avaricious spirit displayed by the two old companies, it would not be at all surprising if an attempt were made to obtain charters for one or two more corporations, and thus verify the old maxim, "Competition is the life of trade." Some inquirers are asking what has become of the "Hydrogenerated Fuel Company?" Perhaps its charter may be bought for a consideration. The liberty given it for "heating *and other purposes*" constitutes a broad scope, and, in the hands of designing men, it might be made to cover a multitude of evils.—*American Gaslight Journal*, Oct. 15.

DR. J. NORTHCOTE VINEN'S REPORT ON THE GAS SUPPLIED BY THE SURREY CONSUMERS COMPANY:—

| 1862. Week ending. | Number of Observations. | Maximum Light. Candles. | Minimum Light. Candles. | Average Light. Candles. |
|---|---|---|---|---|
| Nov. 8 | 4 | 13·15 | 12·18 | 12·50 |
| „ 15 | 4 | 12·98 | 12·83 | 12·92 |

The volume of hydrocarbons averaged 3·75 per cent. Carbonic acid averaged 1·0 per cent. No sulphuretted hydrogen or ammonia could be detected. The maximum pressure was 19/10ths; the minimum, 5/10ths.

# Price Current.

## CASTINGS.—*Per Ton.*

*Average Weight of Cast-iron Gas-pipes, per Yard.*

| 1½ in. | 2 in. | 2½ in. | 3 in | 4 in. | 5 in. | 6 in. | 7 in. | 8 in. | 9 in. | 10 in. | 12 in. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 21 | 28 | 33 | 51 | 70 | 89 | 107 | 126 | 149 | 177 | 208 lb. |

| Retail Prices are 5 to 10 per cent. higher. | London. | Glasgow. | Newcastle | Wales. | Yorkshire, Derbyshire, and Staffordshire. |
|---|---|---|---|---|---|
| | £. s. d. | £. s. d. | £. s. d. | £. s. d. | £. s. d. |
| Pig Iron, No. 1, G.M.B. | 3 7 6 | 3 16 0 | 3 17 6 | 3 0 0 | 3 5 0 |
| 1½ and 2-inch Socket-pipes | 7 0 0 | 6 0 0 | 6 5 0 | 6 10 0 | 6 15 0 |
| 2½ and 3-inch ditto | 6 10 0 | 5 10 0 | 5 15 0 | 6 0 0 | 6 5 0 |
| 5 and 5-inch ditto | 6 0 0 | 5 0 0 | 5 5 0 | 5 10 0 | 5 15 0 |
| 6 inches and upwards ditto | 5 15 0 | 4 15 0 | 5 0 0 | 5 0 0 | 5 10 0 |
| Retorts, 1st fusion, hot blast | 5 10 0 | 4 10 0 | 4 15 0 | 5 0 0 | 5 5 0 |
| Ditto, 2nd ditto, cold ditto | 6 10 0 | 5 5 0 | 5 10 0 | 6 0 0 | 6 5 0 |
| Tank-plates, ¼ thick and above | 6 0 0 | 5 0 0 | 5 5 0 | 5 10 0 | 5 10 0 |

## WROUGHT-IRON TUBING,

*Subject to 40 per cent. Discount.*

| | 2 in. | 1½ in. | 1¼ in. | 1 in. | ¾ in. | ½ in. |
|---|---|---|---|---|---|---|
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Patent Welded Tubes, from 2 to 12 feet—per foot | 1 8 | 1 0 | 0 10 | 0 7 | 0 5 | 0 4½ |
| Ditto ditto, from 6 inches to 18 inches—each | 3 0 | 2 0 | 1 9 | 1 3 | 1 0 | 0 9 |
| Connecting-pieces, or Long Screws | 3 6 | 2 3 | 2 0 | 1 6 | 1 2 | 0 11 |
| Bends, Springs, and Elbows (wrought iron) | 3 9 | 2 3 | 1 9 | 1 0 | 0 10 | 0 8 |
| Tees, wrought or cast | 4 0 | 2 6 | 2 0 | 1 6 | 1 1 | 0 10 |
| Crosses, ditto | 4 6 | 3 0 | 2 6 | 2 0 | 1 6 | 1 2 |
| Iron Cocks | 17 6 | 9 6 | 7 6 | 4 6 | 3 3 | 2 6 |
| Ditto, with brass plug | 28 0 | 16 0 | 15 0 | 7 0 | 5 6 | 4 6 |
| Diminishing Sockets, Caps, Plugs, and Nipples | 1 3 | 0 9 | 0 8 | 0 6 | 0 5 | 0 4 |
| Plain Sockets | 1 0 | 0 8 | 0 7 | 0 5 | 0 4 | 0 3 |
| Syphons, 2-quart | 15 0 | 14 0 | 13 6 | 13 0 | 12 0 | — |

## COALS.—*Per Ton.*

| *Newcastle.—Unscreened.* | | *Scotch Cannel.* | |
|---|---|---|---|
| Whitwell Primroso | 6s. 9d. | Boghead (at Leith) | 45s. 0d. |
| Medomsley, Eighton Moor, and Burnhope | 7 0 | Kirkness, best | 23 0 |
| Pelaw | 7 3 | Capeldrae, 1st quality | 20 0 |
| New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth | 7 6 | Ditto, 2nd ditto | 12 6 |
| Pelton | 7 9 | Ditto (at Leith) | 27 6 |
| Ramsay's Newcastle Cannel | 16 0 | Arniston | 27 6 |
| | | Wemyss | 29 0 |
| | | Knightswood | 18 0 |
| | | Firnie | 14 0 |

## FREIGHTS.

| *Coastwise—Newcastle.—Per Ton.* | | *Foreign.—Per Keel.* | |
|---|---|---|---|
| Chatham and Rochester | 7s. 6d. | Barcelona | £26 0s. |
| Cork | 11 6 | Bordeaux | 16 10 |
| Dover and Folkestone | 7 6 | Boulogne and Calais | 9 0 |
| Dublin | 12 0 | Cadiz | 14 10 |
| Exeter Quay | 10 0 | Cronstadt | — |
| Ipswich | 6 6 | Copenhagen | £10.10s. to 10 15 |
| London (Pool) | 8s. 0d. to 8 1½ | Genoa | 23 15 |
| Lowestoft and Yarmouth | 5 3 | Hamburg | 11 10 |
| Lynn | — | Havre de Grace | 11 5 |
| Portsmouth and Southampton | 6 9 | Leghorn | 23 0 |
| Plymouth | 9 3 | Lisbon | 18 0 |
| Shoreham | 8 0 | Rotterdam | — |
| Whitstable | 8 0 | Stettin | 10 10 |
| Weymouth | 9 6 | Trieste and Venice | 21 0 |

## SUNDRIES.

| | | | |
|---|---|---|---|
| Best Newcastle Fire-bricks—per 1000 | £2.10s. to | £2 | 15s. 0d. |
| Cliff's Fire-bricks (at Wortley)—per 1000 | | 2 | 15 0 |
| Ingham's ditto (at Wortley)—per 1000 | | 2 | 15 0 |
| Fire-clay Retorts—per foot run | 8s. 6d. to | 0 | 7 0 |
| Tough Cake Copper—per ton | | 98 | 0 0 |
| English Pig Lead—per ton | | 21 | 0 0 |
| Welsh Bar Iron (in London)—per ton | | 6 | 15 0 |
| Foreign Spelter—per ton | | 18 | 0 0 |
| English Block Tin—per ton | | 119 | 0 0 |
| Banca—per ton | | 119 | 0 0 |
| Tarred Rope Yarn—per cwt. | | 1 | 6 0 |

## TWO MEDALS AWARDED

# GEORGE GLOVER & CO.'S

# PATENT DRY GAS-METERS,

## STANDARD GASHOLDERS, AND TESTING APPARATUS.

The Sales of Gas Act has rendered a far higher degree of accuracy in Gas-Meters than that generally attained hitherto, indispensable.

This necessity Messrs. GEORGE GLOVER and Co., are prepared to meet, their PATENT DRY GAS-METER being made in accordance with the same high standard of accuracy, and the same conditions and principles as those adopted in the construction of the National Standard Gasholders.

The daily use of these standards at the Exchequer for eighteen months has fully justified the opinion expressed of them by the Astronomer-Royal, in his reports to the Lords Commissioners of Her Majesty's Treasury, as capable of "being applied to Gas Measures of every class, and Gas-Meters of every class, as accurate as it is possible for human skill to make them."

That opinion has been endorsed by the jury in Class X. of the International Exhibition (several of them being eminent in science and engineering), having awarded the fac-simile of the National Standard and the other Gas Apparatus. Messrs. GEORGE GLOVER and Co. exhibit there the only medal for instruments relating to gas measurement which has been awarded in the Class. The award is for "*ingenuity, completeness, and efficiency of apparatus for measuring gas, and for excellence of material and workmanship.*"

Messrs. GEORGE GLOVER and Co. have also had a medal awarded them in Class XXXI. for *the superior construction and workmanship of their Improved Dry Gas-Meter.*

Particulars and lists of prices forwarded on application.

**RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON.**

OFFICES: 22, PARLIAMENT STREET, WESTMINSTER; and 15, MARKET STREET, MANCHESTER.

## INTERNATIONAL EXHIBITION,

**Class XXXI., No. 6300; and Class X., No. 2291; and "Illustrated Catalogue."**

**GAS ENGINEERING OFFICES,**
16, ADAM STREET, ADELPHI, W.C.
*(Close to the Society of Arts.)*

Mr. ANDERSON continues to Erect, or to supply the Drawings for his PATENT RETORT-SETTINGS. On this principle, three Ovens of Retorts are heated by one Coke and one Tar fire; and, for small Works, the principle is adapted to single Ovens in both cases, with a total absence of smoke, while the duration of the Retorts is from two to three years, and with great economy of fuel.

Mr. ANDERSON continues to supply his PATENT GAS-EXHAUSTER, together with Steam-Engines, &c., erected complete.

This is the most simple machine of the kind in use, being merely a double-action Pump, which any one can comprehend, and works for years without any repair.

Also, his PATENT FOUR-WAY VALVES. One of these valves does the work of three ordinary valves, when applied to Purifiers, Station-Meters, or other Gas Apparatus.

A workman cannot, by any possibility, make the mistake of shutting one passage without opening another; thus ensuring a constant flow of the gas.

All Racks, Pinions, Springs, and other delicate parts of ordinary valves, are in these valves abolished; the Connecting-pipes are also much simplified, and the cost reduced fully 30 per cent.

Also, his CONCENTRIC GOVERNOR, which stands in half the space of the ordinary Governor, and regulates the flow of Gas to the greatest nicety.

Mr. ANDERSON having five Gas-works on lease, besides being engineer to several others, has constant opportunities of perfecting his inventions before they are brought under public notice.

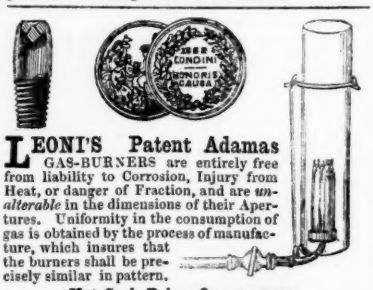
**BENJAMIN GIBBONS, Jun.,**
DEEPDALE FIRE-CLAY & BRICK WORKS,
**Near DUDLEY,**

**Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.**

**FIRE-CLAY RETORTS,**
TO MODEL OR DRAWING.

**B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.**
**References given, if required.**

**ROBERT MACLAREN and CO.,**
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.




**LEONI'S Patent Adamas** GAS-BURNERS are entirely free from liability to Corrosion, Injury from Heat, or danger of Fraction, and are *unalterable* in the dimensions of their Apertures. Uniformity in the consumption of gas is obtained by the process of manufacture, which insures that the burners shall be precisely similar in pattern.

**Net Cash Price, 8s. per gross.**
For COUNTRY AGENCIES, apply to S. LEONI, 34, St. Paul Street, New North Road, LONDON, N.

**WALTER MABON, Engineer,**
ARDWICK IRON WORKS, FAIRFIELD STREET,
MANCHESTER,
Manufacturer of
IRON TANKS for Gasholders, Railway Stations, &c.
GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.
GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contracts for Gas-Works of any Magnitude. Designs, Specifications, and Estimates furnished.
WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.
IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.
PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

**CLEGG ANNUITY FUND**

The following additional Subscriptions received since June 17 are gratefully acknowledged:—

| | £ | s. | d. |
|---|---|---|---|
| The Northampton Gas Company | 10 | 10 | 0 |
| J. Maughan, Esq., Leamington | 1 | 1 | 0 |
| The Leamington Gas Company | 2 | 12 | 6 |
| Messrs. C. B. and J. W. Robinson, Lessees, Leamington | 2 | 12 | 6 |
| The Dudley Gas Company | 2 | 12 | 6 |
| Messrs. J. W. Robinson and Son, Lessees, Dudley | 2 | 12 | 6 |
| Messrs. Robinson, Lessees, Coventry | 2 | 12 | 6 |
| Mr. R. F. Brain, Brussels | 2 | 0 | 0 |
| The Australian Gas Company, Sydney | 10 | 10 | 0 |
| James Barlow, Esq., Sydney | 5 | 5 | 0 |
| T. W. Dyson, Esq., Manchester | 1 | 1 | 0 |
| The Rosendale Union Gas Company, Bacup | 5 | 0 | 0 |
| J. C. Simpson, Esq., C.E., Buenos Ayres | 2 | 0 | 0 |
| Mr. Walter Ford, Gray's Inn Road | 3 | 3 | 0 |
| The Salford Gas Committee | 10 | 0 | 0 |

Subscriptions continue to be received by the Trustees at the London and County Bank, Lombard Street, London; and Mr. Thomas G. Barlow, of 42, Parliament Street, Westminster, has kindly consented to receive, on behalf of the Trustees, all letters and other communications that may be addressed to them.

**E. J. and J. PEARSON, Delph and** Tintam Abbey Fire-Clay and Brick Works,
STOURBRIDGE,

Proprietors of best Glass-house Pot and Crucible Clay; Manufacturers of Glass-house Pots, Crucibles, Gas-Retorts, and Fire-Bricks of every description.

**WHITEHOUSE and CO., Boiler and GASHOLDER MAKERS,**
GLOBE PATENT TUBE WORKS,
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**Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.**
**Orders promptly executed.**

# GUEST & CHRIMES,

FOUNDRY AND BRASS-WORKS, ROTHERHAM,

AND

**37, SOUTHAMPTON STREET, STRAND, LONDON,**

**(Late CROSLEY & CO.,)**

GAS-METER MANUFACTURERS,

**REMOVED, from 103, SOUTHWARK BRIDGE ROAD, LONDON, to**

## ROTHERHAM.

**Sole Manufacturers of CROSLEY & GOLDSMITH'S**

## PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS,

Which, by a simple arrangement of machinery, maintain a constant, true Water-Line.
N.B.—The Patent can be applied to any existing Wet Gas-Meters.

Manufacturers of EXPERIMENT METERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c., &c., similar to those used by Mr. King, of Liverpool; and other Patterns.

**Consumers' Governors; Inspectors' Pocket, and all other kinds of Pressure-Gauges; Thermometers;**

## STANDARD TESTING GASHOLDERS,

And Apparatus required under the Sales of Gas Act.

**STATION-METERS & GOVERNORS; PRESSURE-REGISTERS & EXHAUSTER-REGULATORS.**

Also, Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night. Also,

MANUFACTURERS OF BATEMAN AND MOORE'S, AND CHRIMES'

## PATENT HYDRANTS, OR FIRECOCKS.

Improved Sluice-Cocks and Gas-Valves; Chrimes' Patent High-Pressure Single and Double Loose-Valve and Screw-Down Cocks; Pilbrows' Patent Water-Waste Preventer;

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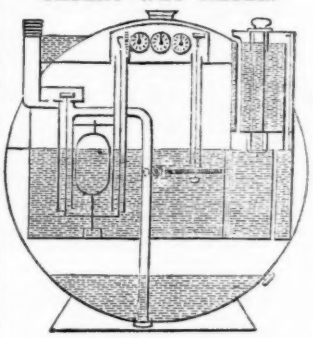
**ESKHOLME'S PATENT PNEUMATIC REGULATOR and VALVE-CLOSET.**

Lowe's Patent Effluvia-Traps, Begg's Improved; Fire-Extinguishing Apparatus; Galvanized Iron Tubes and Fittings;

*Gas Chandeliers, Brackets, and Fittings; Glass Chandeliers and Brackets.*

PATENT WET METER.



# N. DEFRIES,

CONSULTING GAS ENGINEER,

**Inventor and Patentee**

OF

## WET GAS-METERS,

WITH SELF-ADJUSTING WATER-LINE;

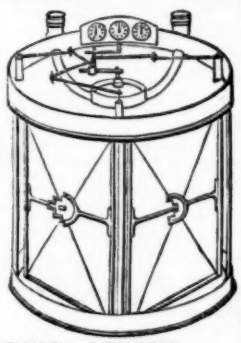
## DRY METERS,

GAS-HEATING BATHS, OVENS, STOVES,

**GAS FIRES with INDESTRUCTIBLE FUEL,**

*&c., &c.*

PATENT DRY METER.



**FACTORY: DIANA PLACE, FITZROY SQUARE. OFFICE: 406, EUSTON ROAD, LONDON,**
**Eight Doors from Factory.**

Attempts having been made to construct Self-Supplying Apparatus to Wet Gas-Meters upon the Bird Fountain principle,—which, although unerring to supply water in the open atmosphere, has not wholly succeeded so as to be relied upon when enclosed in a Gas-tight Meter Case,—N. DEFRIES begs leave most respectfully to acquaint Gas Companies, and the Public in general, that he has constructed his PATENT WET GAS-METER upon a method entirely different, being founded on the well-known principle of the self-acting supply of the Oil Lamp, which has never been applied for the adjustment of the Meter Water-Line before, and which, by the admission of external air to a chamber sealed from Gas, will never fail to faithfully perform its required function. They are of the very best materials and workmanship, will stand more pressure than is required as the test for soundness by the New Act, are guaranteed to prevent surreptitious burning without detection, and will be kept in repair free of charge for seven years.

## N. DEFRIES'S CELEBRATED DRY METERS,

of which more than 80,000 are in use in Palaces, Churches, Chapels, Royal Dockyards, Club Houses, Public Offices, and other Buildings throughout the Empire and Continent, which have done so much in checking surreptitious burning, and simplified the fitting up of Gas.

To remove any doubt of accuracy of measurement his Meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that Building was destroyed by Fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company in the presence of George Lowe, Esq., F.R.S., and other Chief Officers, and found inflexibly correct. Also, on the 9th of June, 1858, at the Western Gas-Works, his Meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests—from the full lighting to a single Jet—and in each case, as in other instances, accuracy was finely indicated.

As to durability, his two large Meters at the Thames Tunnel have been in use night and day for upwards of twelve years—one continuation of dark hours—subjected to the wear and tear of seventy-five years as compared with the ordinary business hours of using Gas above ground.

## LORD REDESDALE'S SALE OF GAS BILL.

**All Meters constructed by N. DEFRIES are guaranteed to pass the Provisions of the Standard.**

No alteration has been necessary in the Meters he continues to supply to the Chartered, Imperial, City of London, Equitable, and other large Companies, his accustomed range of 1 per cent. over and under meeting all the desired requirements; whereas, by the New Act, a greater departure from accuracy—viz., 2 per cent. fast to 3 per cent. slow—is permitted.

**W. J. HOLLANDS,**
IRON MERCHANT,
**31, BANKSIDE, LONDON, S.E.**
Socket, Flange, Hot Water-pipes, and all Connexions; Retorts, Hydraulic Main, Lamp-Columns, &c.; and every description of Castings and Wrought-Iron-Work for Gas and Water-Works, Steam, and general purposes.
N.B.—All goods kept in stock, and supplied at manufacturers prices.
Superior Newcastle Cannel Coal, direct from the Collieries.
Estimates given, and orders by post punctually attended to the same day.

**BIRTLEY IRON WORKS,**
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas Works and Water Works.
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

**JOHN WALKER,**
Manufacturer of Fire-Bricks, Chimney-Tops, Gas-Retorts, &c.
OAK FARM FIRE-CLAY AND BRICK WORKS.
KINGSWINFORD, NEAR DUDLEY.
N.B. A Quantity of Circular and D-Retorts always in Stock.

**SAMUEL CUTLER, Gasholder**
MAKER and CONTRACTOR
For Tanks, Roofs, Purifiers, Condensers, Erection and Alteration of Works and every description of GAS APPARATUS.
PROVIDENCE IRON WORKS,
MILL WALL, POPLAR. LONDON, E.
Main Laying and Gas-Works erected complete.

**WEST and GREGSON, Gas-Meter**
MANUFACTURERS, &c.
UNION STREET, OLDHAM.
Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide-Valves, &c. &c.
W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

**GEORGE CUTLER & CO.,**
GAS ENGINEERS, &c.,
**London Gasholder and Boiler Works,**
8, WHARF, WENLOCK ROAD, CITY ROAD, N.,
LONDON.

Rye, Nov. 12, 1860.
Dear Sirs,—I consider it incumbent on me to acquaint you that the alterations recently made on the Rye Gas-Works—viz., the addition of a NEWLY-IMPROVED WASHER, and other work for the Purification of Gas, executed by the experienced workmen under your able supervision—are perfectly satisfactory to the Company, and the Gas is now as pure as it can be made.
I am, dear Sirs, your obedient servant,
CHARLES THOMAS, Superintendent,
Rye Gas-Works.
Messrs. Cutler and Co.

TO INVENTORS AND PATENTEES.
**MR. W. H. BENNETT,** having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the advertiser, 42, Parliament Street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

**ADDISON POTTER,**
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

**JOHN ROGERSON and CO.,**
NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.
Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.
LONDON HOUSE:
12, ROYAL EXCHANGE BUILDINGS.

**HARRIS and PEARSON,**
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.
MANUFACTURERS OF
**FIRE BRICKS, GAS RETORTS, &C.**
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.
*Late in the occupation of I. and W. King.*
*Originally J. Pidcock, Esq.*
NB. A quantity of best Clay Retorts in stock, viz.—Circulars, 14 inches, 15 inches, 16 inches.
D's, 16×12, 15×14, 20×16, 16×18.

**JAMES OAKES and CO.,**
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD,
CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
CHARLES HORSLEY, Agent.

**DUPLEX GOVERNOR,** for Gas-EXHAUSTER ENGINES.
D. LANE'S PATENT.
This Governor combines great delicacy with remarkable certainty of action. A pressure of one-tenth of an inch of water, operating on a diaphragm of 3 inches diameter, is sufficient to work the Regulating-Valve of an Engine of any power.

TESTIMONIALS.
Borough Engineer's Office, Town Hall
Halifax, March 29, 1862.
Dear Sir,—I have much pleasure in bearing my testimony to the efficiency of your Duplex Governor for regulating the speed of Gas-Exhausters.
The Governor has been perfectly self-acting, and has never given us one moment's thought, trouble, or expense. The engine-man has only to weight the tappets to the required vacuum, and the pressure-register paper never shows a greater variation than three-tenths in the twenty-four hours.
I can very confidently recommend the adoption of it to engineers and managers of gas-works making 50 million feet a year and upwards.
I am, dear Sir, yours faithfully,
G. W. STEVENSON.
Denny Lane, Esq., Cork Gas-Works,
Ireland.

Gas-Works, Cork, April 4, 1862.
Dear Sir,—Having for some time past had in use three of your newly-invented Regulators for governing the speed of Steam-Engines in connexion with Gas-Exhausters, I am glad that I am able to speak of this valuable machine in terms of the highest praise. I have had them applied, as you know, to high-pressure and condensing engines, with Beale's and also Anderson's Exhausters. In every case, this small and valuable instrument is thoroughly effective in regulating the speed of the Exhauster. No amount of care with the hand can equal its accuracy of action for the intended purpose.
Denny Lane, Esq. A. H. STILL, C.E.

An Illustrated Circular, explaining the operation of the Governor, can be obtained by application to D. LANE, 72, South Mall, CORK; and the Governor can be seen in London at the Offices of GEO. ANDERSON, Esq., C.E., 16, Adam Street, ADELPHI.

**LESLIE'S PATENTS:** Gas and Coke from common Coal, greatly increased in value.—60, Conduit Street, LONDON, W.

**LESLIE'S PATENTS:** Up to Forty Candle Gas.—60, Conduit Street, LONDON, W.

**LESLIE'S PATENTS:** Licenses for England, Scotland, and Ireland, the 86 Departments of France and Belgium.—60, Conduit Street, LONDON, W.

**LESLIE'S PATENTS:** The National Waste Heaps at Collieries UTILIZED for Gas purposes.—60, Conduit Street, LONDON, W.

**WILLIAM RICHARDSON & SON,**
Gas and Hydraulic Engineers, and General Ironfounders; Steam-Boiler and Gasholder Manufacturers.
Offices and Stores—41, Meriden Street, BIRMINGHAM.
Works—Tunnel Foundry, DUDLEY.

**READY and MEYNELL,**
BILSTON STREET WORKS,
**WOLVERHAMPTON.**
Manufacturers of Gas-Fittings of every description, Lamps and Chandeliers, Star and Sun-Lights, and Mediæval and other Church-Fittings to any design.

**GEORGE BOWER,**
GAS ENGINEER, MANUFACTURER,
AND CONTRACTOR,
**ST. NEOT'S, HUNTS.**
References to between 100 and 200 Gas-Works Designed and Erected by the Advertiser.

**JAMES NEWTON & SONS,**
**(Established 1820,)**
**FIRE-BRICK AND TILE MERCHANTS,**
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
**GAS AND WATER WORKS.**

**HENRY BALFOUR AND CO.,**
ENGINEERS & IRONFOUNDERS.
**DURIE FOUNDRY,**
LEVEN, FIFE;
& 16, ADAM STREET, ADELPHI, LONDON, W.C.
Gas Engineers and Contractors for Gas and Water-Works; manufacturers of Steam Engines and Exhausters, Steam Boilers, Gasholders, Cast-Iron Tanks, Purifiers, Condensers, Iron Retorts, Gas and Water Pipes.
Plans, Specifications, and Estimate furnished for new, or for extensions and alterations on existing, Works.

**ALFRED PENNY,** Gas and CONSULTING ENGINEER,
WENLOCK IRON WORKS,
21 & 22, WHARF ROAD, CITY ROAD, LONDON.
Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.
Plans, Specifications, and Estimates prepared.

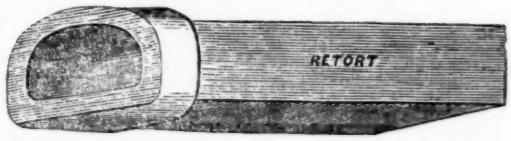
**INTERNATIONAL EXHIBITION,**
1862. CLASS X.
**PRIZE MEDAL**
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
**WILLIAM STEPHENSON & SONS,**
**THROCKLEY,**
**NEWCASTLE-ON-TYNE,**
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE-BRICKS, CLAY RETORTS
&c. &c.
RETORT MOUTHPIECES, BOLTS, NUTS, &c.

**International Exhibition,**
*July* 11, 1862.
Class X., No. 2259.
**The Jurors have AWARDED A MEDAL to**
**JOSEPH CLIFF and SON,**
**Wortley, nr. Leeds,**
**For Excellence of Material and Manufacture of**
FIRE-CLAY RETORTS FOR GAS.

**International Exhibition,**
*July* 11, 1862.
Class XXXV., No. 6841.
**JOSEPH CLIFF and SON,**
**Wortley, nr. Leeds,**
**Are Awarded Honourable Mention for**
STONEWARE DRAIN-PIPES
**OF LARGE DIAMETER.**

# KING BROTHERS,

## STOURBRIDGE FIRE-BRICK AND RETORT WORKS.




KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

**Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Bars, Flues, and Quarries, are all Manufactured of the same quality of Clay.**

**Every Retort and Brick is branded "King Brothers, Stourbridge."**

# R. LAIDLAW & SON,

GAS ENGINEERS, IRON & BRASS FOUNDERS,

**Alliance Foundry, 147, East Milton Street, and Barrowfield Iron-Works,**

**GLASGOW;**

AND AT SIMON SQUARE, EDINBURGH;

MANUFACTURERS OF

**STATION & CONSUMERS METERS, ALL SIZES;**

WROUGHT-IRON TUBES, FOR GAS, WATER, & STEAM; CAST-IRON RETORTS & PIPES;

**HYDRAULIC MAINS, CONDENSERS, WASHERS, SCRUBBERS, PURIFIERS, & TANKS.**

**GASHOLDERS;**

**GOVERNORS, SLIDE-VALVES, &c.;**

WROUGHT & CAST IRON ROOFS & HOUSES.

*Contractors for Gas-Works of any Magnitude.* *Plans, Specifications, and Estimates furnished.*

SOLE AGENT FOR THE SOUTH, SOUTH-EAST, AND SOUTH-WEST OF ENGLAND:—

**J. E. DOWSON, 8, BANKSIDE, SOUTHWARK, LONDON, S.E.**

# TRUSS'S PATENT ELASTIC PIPE-JOINT,

## FOR GAS AND WATER-MAINS, AND STEAM PIPING,

Is the only PERFECT joint that has ever been constructed, and supplies the long-felt desideratum, by allowing for the expansion and contraction of metals, and for oscillation and deflection, without impairing the joint. Gas Companies will effect an incalculable saving in adopting it, as compared with the present imperfect mode of jointing.

Drawings, Estimates, and every particular, furnished on application to

**THOMAS SEAVILLE TRUSS, C.E., 53, GRACECHURCH STREET, LONDON, E.C.**

# LLOYD AND LLOYD

## ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

**WROUGHT-IRON TUBES & FITTINGS,**

PLAIN, GALVANIZED, & ENAMELLED, for Gas, Steam, and Water, from ⅛ in. to 6 in. bore.

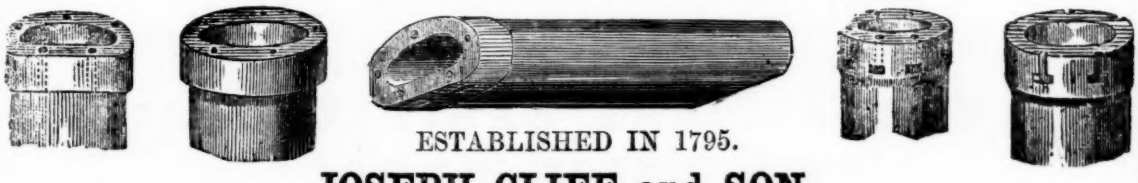
**STOCKS TAPS, and DIES, GUN METAL GLAND-COCKS, WATER-GAUGES, &c.;**

**PATENT LAP-WELDED IRON TUBES,**

For Locomotive and Marine Boilers, &c.

**LONDON WAREHOUSE—No 66, QUEEN STREET, E.C.**

# FIRE-CLAY GAS RETORTS.



ESTABLISHED IN 1795.

# JOSEPH CLIFF and SON,

## WORTLEY FIRE-BRICK WORKS, near LEEDS,

**Are Awarded the PRIZE MEDAL for Excellence of Material and Manufacture of Clay Retorts, July 11, 1862. Class X., No. 2259.**

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

THE WORKS ARE WELL SITUATED

**For EXPORT from the Ports of LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.**

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

**M. P. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.**

# WILLIAM INGHAM AND SONS,

## WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

**RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,**

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

**Estimates for Setting, or Bricklayers sent when required.**

**GAS OVENS IN SEGMENTS OF EQUAL QUALITY.**

**A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.—Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.**

N.B.—*Export orders continue to have prompt attention.*

# WILLIAM RICHARDS,

## SOLE INVENTOR AND FIRST MANUFACTURER

OF THE

## DRY GAS-METER,

**Which obtained Prizes at the Exhibitions of London, 1851; New York, 1853; Paris, 1855; and three Prizes at the present Exhibition of 1862.**

**CRAWFORD PASSAGE, COPPICE ROW, CLERKENWELL, LONDON.**

W. RICHARDS invites the attention of Gas Companies and Engineers to the Dry Meter manufactured by him, as possessing advantages over others, by his method of disposing of the flexible material, so that collapsing or bagging of the same is avoided. This defect, so conspicuous in some of the meters of other makers shown at the Exhibition, causes the measurement of the instrument to vary under different circumstances, and the durability of the same is materially impaired.

In the meters manufactured by W. Richards, all the metals of the working parts are incorrodible; the flexible material, the best that can be employed; and, in general construction, they are not to be surpassed.

To those who prefer the Wet Meter, W. Richards submits his patented improvements in the same, which consist n contracting the measuring-wheel at, and near, the water-line—thus allowing of a longer range for the float, and avoiding the sudden extinctions now so common; also, a simple remedy is applied to prevent fraudulent consumption, which the operation of the Sales of Gas Act has so much facilitated.

## TELL-TALE EXHAUST AND PRESSURE-INDICATORS;

**GOVERNORS, STATION-METERS, &c.**

# WILLIAM SUGG,

**MANUFACTURER OF**

**PATENT DRY AND WATER GAS-METERS, TEST GASHOLDERS, AND APPARATUS,**

## "EVANS'S" PHOTOMETERS,

**Experimental Meters, Minute Clocks, &c., Station-Meters and Governors,**

**STREET-LAMP GOVERNORS AND LAVA BURNERS,**

## 19 and 20, MARSHAM STREET, WESTMINSTER.

# INTERNATIONAL EXHIBITION, 1862.

## TWO PRIZE MEDALS.

**Class 13, No. 2973.**

**PHOTOMETERS, &c.,**

Jury Award: PRIZE MEDAL,

**For "Photometric Apparatus—for a well-constructed Apparatus to determine the Illuminating Power of Coal-Gas."**

(PHILOSOPHICAL INSTRUMENTS, *North Gallery.*)

**Class 31, Section B, No. 6350.**

**METERS, GOVERNORS, &c.,**

Jury Award: PRIZE MEDAL,

**For "General Excellence of Workmanship, and for his Improvements in Gas-Burners and Photometrical Apparatus."**

(*Opposite* AMERICAN DEPARTMENT.)

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

**ORLANDO BROTHERS,**

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

**TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.**

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

---

**INTERNATIONAL EXHIBITION, 1862.**

Class X. No. 2265.

THE JURORS HAVE AWARDED TO

**JOSEPH COWEN & CO.,**

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

THE PRIZE MEDAL FOR "GAS RETORTS, FIRE-BRICKS, &c., FOR

**EXCELLENCE OF QUALITY."**

JOSEPH COWEN & CO. were the only parties to whom a Prize Medal was awarded in the Great Exhibition of 1851 for

**"GAS RETORTS AND OTHER OBJECTS IN FIRE-CLAY."**

---

**SERVIER'S**

PATENT

**SELF-ACTING GAS GOVERNOR.**

This Instrument, which is designed to replace the ordinary Governor,

**Operates solely by the Action of the Gas, without any Alteration of Weights, or the Assistance of any intermediate Agency or Apparatus whatever;**

And it will maintain a Constantly Uniform Pressure in Gas-Distributing Mains, at any given point of their circuit.

All Applications for Licences to Manufacture or to Use the Apparatus to be made to

**Mr. W. H. BENNETT, 42, Parliament Street, Westminster.**

---

**WILLIAM & BENJAMIN COWAN,**

PATENT WET & DRY GAS-METER MANUFACTURERS,

**Buccleuch Street Works, Edinburgh, & 13, Strutt Street, Manchester.**

**Established 1827.**

SOLE MANUFACTURERS OF

**ESSON'S PATENT COMPENSATING GAS-METERS;**

**KAY'S PATENT HYDRAULIC VALVE GAS-METERS;**

Also, DRY METERS OF THE MOST APPROVED DESCRIPTION;

All of the above being Stamped under the Provisions of the SALE OF GAS ACT.

W. and B. C. likewise supply ESSON'S PATENT COMPENSATING FOUNTAINS, and KAY'S PATENT HYDRAULIC VALVES, now so extensively used for bringing ordinary Meters within the requirements of the Act of Parliament. Gas Companies can, therefore, either attach the FOUNTAINS or VALVES to their old Meters themselves, or forward them to W. and B. C. for Alteration and Stamping.

**GOVERNORS, STATION-METERS, PRESSURE-REGISTERS & GAUGES,**

MINUTE-CLOCKS, PHOTOMETERS, EXPERIMENTAL METERS,

AND ALL OTHER DESCRIPTIONS OF GAS APPARATUS.

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**INTERNATIONAL EXHIBITION,**

**Class 31 (Sub-Class B), No. 6288.**

## International Exhibition, 1862.

MESSRS.

# CROLL, RAIT, AND CO.,

Manufacturers of Croll's Patent Improved

# DRY GAS-METER,

Exhibited in Class XXXI. (B),

Have obtained the Medal for

"GOOD CONSTRUCTION AND SOUND WORKMANSHIP."

FACTORY:

CANAL BRIDGE, KINGSLAND ROAD, LONDON, N.E.

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# ALEXANDER WRIGHT,

55 and 55A, MILLBANK STREET, WESTMINSTER, S. W.,

MANUFACTURER OF

CONSUMERS' COMPENSATING & NON-COMPENSATING WET GAS-METERS,

Of the best material and workmanship, carefully adjusted to meet the requirements of the SALES OF GAS ACT.

STATION-METERS & GOVERNORS,

WRIGHT'S REGISTERING PRESSURE-GAUGE, EXHAUSTER REGISTER, & REGULATOR;

STANDARD TEST GASHOLDERS;

Consumers' Governors; Inspectors' Pocket, King's, and all other kinds of Pressure-Gauges; Thermometers for Condensers, Pressure Registers, &c., &c.

EXPERIMENTAL TESTING APPARATUS,

Employed by the best experimenters in this country and on the continent, and by the Gas Testers in the London districts.

PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, BI-SULPHURET OF CARBON TEST, THOMPSON'S BROMINE AND HEATING POWER OF FUEL TESTS, IMPROVED ALKALIMETER, EXPERIMENTAL METERS AND GOVERNORS, MINUTE CLOCKS, &c., &c.

"Analysis of Gas for Practical Men," new and enlarged edition, with "Gas-Meter Testing under Sales of Gas Act," p.p. 25 Stamps.

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# JAMES MEACOCK,

PATENT DRY AND WET GAS-METER MANUFACTURER,

7, SNOW HILL, AND 16, WEST STREET, LONDON.

ESTABLISHED 1836.

J. M. invites attention to his Improvements in EXPERIMENTAL WET GAS-METERS, by which he renders impossible any Leakage from the Stuffing-Box.

These METERS are GUARANTEED to meet all the Requirements of the SALE OF GAS ACT

GOVERNORS, STATION-METERS, PHOTOMETERS,

EXPERIMENTAL TESTING GASHOLDERS, HIGH-PRESSURE GAUGES,

AND ALL APPARATUS IN USE AT THE GAS MANUFACTORY.

---

# D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE BLACK & GALVANIZED. COPPER. TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—60s. net.

*Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.*

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.


London: Printed by WILLIAM BOUGHTON KING (at the Office of Clayton and Co., 17, Bouverie Street, Fleet Street) and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, November 18, 1862.